

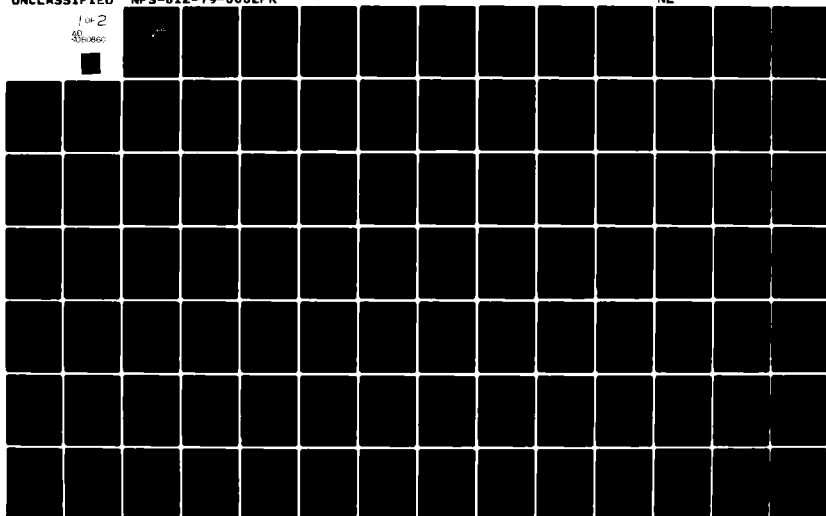
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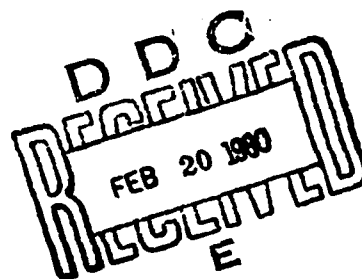
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9 Report, for the Period  
1 April 1978 to 30 September 1978

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Superintendent

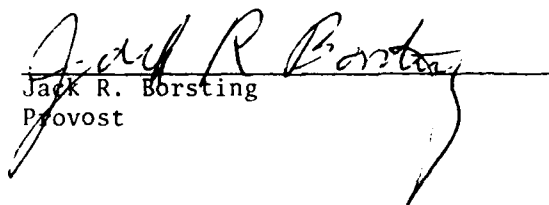
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March 1979

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This publication contains abstracts of theses and research papers submitted for Aeronautical Engineer, Mechanical Engineer, Master of Science degrees and Master of Arts degrees during the period 1 April 1978 - 30 September 1978.

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Theoretical Analysis of  
Transonic Flow Past  
Unstaggered Oscillating Cascades

Peter Carlton Olsen  
Lieutenant, United States Coast Guard  
B.S., United States Coast Guard Academy, 1970  
M.S., University of West Florida, 1975  
M.S.A.E., Naval Postgraduate School, 1977  
M.S.O.R., Naval Postgraduate School, 1978

This paper presents an independent verification of the collocation method as a technique for calculating the lift on an oscillating airfoil in an unstaggered cascade immersed in transonic flow. This method was originally proposed by Gorelov. Results presented here differ somewhat from those presented by him. Two formulations are shown; one is purely numerical, the second employs an analytic expansion for small frequency.

Aeronautical Engineer  
September 1979

Thesis Advisor: M.F. Platzler  
Aeronautics Department

A Computer Simulation of a  
Naval Boiler

Wallace Paul Fini  
Lieutenant Commander, United States Navy  
B.S.E.E., Worcester Polytechnic Institute, 1967

A non-linear computer model of a U.S. Navy D-Type Boiler was developed using lumped parameters. The program was coded in IBM CSMP-III simulation language. A companion routine was also coded to permit the user to implement the model for a particular boiler using only readily accessible data. The model was adapted for a Combustion Engineering Type V-2M boiler for analysis.

Master of Science in  
Mechanical Engineering  
and  
Mechanical Engineer  
September 1978

Thesis Advisor : T. Houlihan  
Mechanical Engineering  
Department

The Enhancement of Heat Transfer  
in  
a Rotating Heat Pipe

Ignatius Slamet Purnomo  
Major Artillery, Republic Indonesian Army

A linear triangular finite element formulation was used to solve the steady state two dimensional conduction heat transfer equation. A FORTRAN IV computer program of the above formulation, employing double precision arithmetic and compact storage techniques, was applied to study heat transfer in an internally finned rotating heat pipe. Results were obtained for water in a copper and stainless steel condenser with varying outside heat transfer coefficient, rotational speed, and fin angle (number of fins).

Numerical results of the heat transfer rate in the copper condenser were shown to have less than 2% variance to those obtained earlier. A rotating heat pipe designed to operate with a small value of outside heat transfer coefficient experiences no significant increase of the heat transfer rate with an increase in rotational speed, since the value of the outside thermal resistance dominates.

Heat transfer rate continuously increases as the fin angle decreases. However, the increase is only slight when the fin angle is less than 11 degrees.

Master of Science in  
Mechanical Engineering  
and  
Mechanical Engineer  
June 1978

Thesis Advisor: P. J. Marto  
Mechanical Engineering  
Department

Hot Flow Testing of Multiple  
Nozzle Exhaust Eductor Systems

Daniel Roy Welch  
Lieutenant, United States Navy  
B.S.NavArch., United States Naval Academy, 1971

Hot flow model tests of multiple nozzle exhaust eductor systems were conducted to evaluate effects of exhaust temperature on eductor performance. A one-dimensional analysis of a simple eductor system based on conservation of momentum for an incompressible gas was used in determining the non-dimensional parameters governing the flow phenomenon. Eductor performance is defined in terms of these parameters. An experimental correlation of these parameters which was previously developed and used to correlate cold flow data was found to be effective in correlating both cold and hot flow data for eductor systems. Temperature data was obtained for the mixing stack wall and the exhaust flow at the mixing stack exit plane.

Master of Science in  
Mechanical Engineering  
and  
Mechanical Engineer  
September 1978

Thesis Advisor: P. F. Pucci  
Mechanical Engineering  
Department

Design of Software Package for Incorporation  
of Random Load Testing and Data Processing  
on Materials Testing System Machine

Frederick Martin Blakely  
Lieutenant Commander, United States Navy  
B.S., Naval Postgraduate School, 1970

This thesis describes the software design and implementation of a microprocessor-based, random load drive and data acquisition system on a Material Testing System (MTS) machine.

A microprocessor, combination analog input/output module, magnetic cassette tape recorder, and strain gage network form a strain data acquisition system for recording sequential strain peaks and troughs on specimens subjected to flight load histories. The data will be used to estimate the fraction of the fatigue life expended in a test specimen.

A high speed digital computer is linked by telephone line to a microcomputer development system to create the randomization of fatigue loads specified in Mil Spec 8866 Spectrum A for use by the MTS machine.

Master of Science in  
Aeronautical Engineering  
June 1978

Advisor: G. H. Lindsey  
Department of  
Aeronautics

## HIGH SPEED DATA ACQUISITION SYSTEM

Mack Taylor Elliott  
Lieutenant, United States Navy  
B. S., University of South Carolina 1971

This paper describes the expansion and modification of an existing data acquisition system to effect extensive improvements in speed and flexibility. A microprocessor, flexible disk drive, analog to digital converter, direct memory access module, and high-speed line printer were integrated and interfaced to an IBM 360 digital computer with a high-speed data transmission line.

The resultant system provided the capability of digitizing up to sixteen analog inputs simultaneously at rates in excess of 45,000 samples per second. The experimental data could be transmitted expeditiously to the IBM 360 computer for efficient manipulation. Additional benefits gained from the system were its capabilities as a remote terminal for the IBM 360 and a typewriter-quality word processor. The data acquisition and reduction system was qualified for functional performance and speed through a series of test exercises. The word processor was demonstrated in the production of this document.

Master of Science in  
Aeronautical Engineering  
September 1978

Advisor: Louis V. Schmidt  
Department of  
Aeronautics



Application of Light Extinction  
Measurements to the Study of Combustion  
in Solid Fuel Ramjets

Michael Edward Hewett  
Lieutenant, United States Navy  
B.S., University of Washington, 1969

An experimental investigation of the combustion behavior in solid fuel ramjets was conducted. Optical light extinction measurements were employed to determine the effects of fuel composition and bypass ratio on the combustion efficiency, percent and size of unburned carbon, and fuel regression rate. Utility and limitations of the optical method are presented.

Master of Science in  
Aeronautical Engineering  
June 1978

Thesis Advisor: D.W. Netzer  
Aeronautics  
Department

The Development and Implementation of Algorithms  
for an A-7E Performance Calculator

Gary Lang Koger  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1971

In this thesis, the algorithms for an A-7E aircraft performance calculator were developed and then implemented on three small data processors of different programming levels and storage capabilities.

The utility of data is a function of several variables including accuracy and availability. The problem of retrieving performance data from the Naval Air Training and Operating Procedures Standardization (NATOPS) Manuals is significantly lessened by the devices demonstrated in this investigation. Nine performance chart groups, yielding data usually considered necessary for flight, were reduced to a series of analytical expressions. These analytical expressions were demonstrated to reproduce NATOPS Manual data to a high degree of accuracy.

Implementation was demonstrated on a desk computer, a hand held calculator and a microprocessor.

Master of Science in  
Aeronautical Engineering  
September 1978

Advisor: R. Panholzer  
Electrical Engineering  
Department

An Experimental Investigation of the  
Dual Chamber Rocket

James Francis McFillin, Jr.  
Lieutenant, United States Navy  
B.A., University of Pennsylvania, 1969

An experimental investigation was conducted to determine the feasibility and practicality of the dual rocket motor concept. Cold flow studies were performed with the aid of a ground-test simulator which incorporated a telescoping booster cavity. The effects of booster cavity length, booster cavity shockdown pressure, booster/sustainer nozzle area ratios, and aft nozzle removal on thrust and performance were explored and discussed.

Master of Science in  
Aeronautical Engineering  
June 1978

Advisor: D. W. Netzer  
Department of  
Aeronautics

A Preliminary Investigation of  
Aural Input/Output Systems for  
In-Flight Information Retrieval

Albert George Mertz  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1969

An analysis of two commercially available Speech Understanding Systems (SUS) was conducted. Each system was tested against various background noise conditions. Results obtained were compared with current criteria for SUS application in aircraft. Additionally, since the P-3 Orion aircraft is being considered as a SUS test aircraft, a survey of Fleet P-3 pilots was conducted. Their opinion was sought on what a SUS equipped microprocessor should be capable of accomplishing as an aid to the flight crew.

Master of Science in  
Aeronautical Engineering  
September 1978

Advisor: D. M. Layton  
Department of  
Aeronautics

Computerization of Aircraft Naval Air Training and  
Operating Procedures Standardization (NATOPS)  
Flight Performance Charts

Johnny Dean Restivo  
Major, United States Marine Corps  
B.A., Texas A&M University, 1966

This thesis computerizes aircraft Naval Air Training and Operating Procedures Standardization Program (NATOPS) flight performance charts and shows it to be feasible with a high degree of accuracy. The computer programs developed are Normal Take-off and Cruise Performance for the A-6E aircraft and are adaptable to hand-held calculators, desk calculators, or existing aircraft systems computers. The feasibility, procedures, and techniques shown in this thesis are applicable to any aircraft, both fixed and rotary wing.

A much improved and more accurate method of mission planning is needed to reduce NATOPS chart errors during pre-flight planning and to reduce the accident potential of air crews who make performance decisions during flight from past experience or old information, without accounting for all variables which affect aircraft performance. A large percentage of Navy/Marine Corps aircraft accidents has been directly or indirectly attributed to misinterpretation of NATOPS charts and/or poor performance decisions. Computerized NATOPS performance charts will significantly reduce human errors inherent to visual chart interpretation and, when coupled with aircrews having computer access to make airborne aircraft performance decisions based on all performance variables, will greatly enhance safety of flight in completing any or all mission phases, thereby increasing operational readiness of all Navy/Marine Corps fleet units.

Master of Science in  
Aeronautical Engineering  
June 1978

Advisor: Donald M. Layton  
Department of  
Aeronautics

An Experimental Investigation  
of  
Turbojet Test Cell Augmentors

Charles Nim Sapp, Jr.  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1965

A one-eighth scale turbojet test cell was used to investigate the effects of various design parameters on augmentor performance. The augmentor inlet design, nozzle-to-augmentor spacing, engine flow rate, nozzle total temperature and pressure, and augmentor tube diameter were varied to determine what effect they had on augmentation ratio, total air pumped through the system, and pressure, temperature, and velocity distributions within the augmentor tube. In addition, two augmentor tubes were combined in tandem to investigate the characteristics of a tertiary augmentor configuration.

Master of Science in  
Aeronautical Engineering  
June 1978

Thesis Advisor: D.W. Netzer  
Aeronautics  
Department

Computerization of Tactical Aircraft  
Performance Data for Fleet Application

William Morris Siegel  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1965

The nature of operations, variety of missions and configurations, and requirement for rapid response of fleet tactical aircraft has given rise to a unique problem within the Naval Aviation community, this being the interface between the aircrews and the aircraft performance prediction information supplied via charts and data in the Naval Air Training and Operating Procedures Standardization (NATOPS) Manuals. The data presented are not optimally used due to the method of presentation and the time and effort required to extract useful predictions. This investigation addressed the problem by developing a suitable method of NATOPS curve presentation that has sufficient simplicity and accuracy for application to current compact computers. The procedure is defined and numerical algorithms produced which demonstrate the feasibility and desirability of this type of implementation.

Master of Science in  
Aeronautical Engineering  
June 1978

Thesis Advisor: L. V. Schmidt  
Aeronautics Department

## Computer Selection and Evaluation

A. Nevzat Bayraktar  
Lieutenant, Turkish Navy  
B.S., Turkish Naval Academy, 1971

Published approaches to computer evaluation and selection were reviewed. Preliminary steps and specification development were discussed. Alternative techniques for computer evaluation and for workload description were contrasted. Proposed solicitation methods, computer procurement plans and computer performance measurement and evaluation techniques were surveyed.

Master of Science in  
Computer Science  
June 1978

Advisor: Ronald J. Roland  
Computer Science  
Department



Logical Data Base Design  
for  
Relational Data Base Systems

Jack Albert Chapman  
Lieutenant Colonel, United States Marine Corps  
B. S., Illinois Institute of Technology, 1961

Theories and guidance for logical data base design have lagged far behind the advances in physical data base design. The advent of sophisticated data base management systems has relieved the user of many of the problems of physical data base design, but has placed more emphasis on good logical design. The theory behind logical data base design is explored and a step by step procedure for the logical data base design procedure is presented, employing mathematical and operations research techniques.

Master of Science in Computer  
Science  
June 1978

Advisor: S. T. Holl  
Department of  
Computer Science

Microcomputer Based Flight Data  
Recorder/Monitor with Solid State Memory

Darl Eugene Easton  
Captain, United States Air Force  
Bachelor of Aeronautical Engineering  
Embry-Riddle Aeronautical Institute, December 1968

The design, breadboard implementation and functional testing of a Digital Flight Data Recorder/Monitor prototype is reported. Microcomputer interfacing to Magnetic Bubble Memory and a digital data bus was accomplished. The microcomputer is to be used to collect and analyze flight parameters and record only significant data for later use in an accident investigation or maintenance debriefings for accident prevention. The Magnetic Bubble Memory is the nonvolatile recording media. The digital data bus interfaces to the IEEE 488 instrument bus will allow operational testing of the recorder on an aircraft equipped with a complete data acquisition system.

Master of Science in  
Computer Science  
June 1978

Advisor: Uno R. Kodres  
Computer Science  
Department

A MICROCOMPUTER BASED SHIPBOARD  
SURFACE-SUBSURFACE CONTACT PLOTTER SYSTEM

Antonio Luiz Soares Goncalves  
Lieutenant Commander, Brazilian Navy  
B.S., Brazilian Naval Academy, 1964

and

Javier Enrique De la Cuba Bravo  
Lieutenant (JG), Peruvian Navy  
B.S., Peruvian Naval Academy, 1974  
M.S. Comp. Sys. Mgt., Naval Postgraduate School, 1977

Today, in most shipboard Combat Information Centers, true motion plots of own ship's motion and or surface/subsurface contacts are provided with the aid of electro-mechanical devices like the dead-reckoning tracer ("DRT") or the NC-2 plotter. These devices suffer a variety of drawbacks, such as inflexibility and the need to "track" the light-spots manually. This thesis has developed a flexible, labor-saving, true-motion plotter using contemporary microcomputer and plasma display technologies. An automatic display of contact data, analogous to the plexiglass "surface status board" is also provided. Contact course, speed and CPA information are computed automatically and, unlike the DRT or the NC-2 plotter, both the geographic and tabular displays can be easily duplicated on the bridge and elsewhere.

Master of Science in  
Computer Science  
June, 1978

Advisor: Stephen T. Holl  
Computer Science  
Department

NPS-PASCAL  
A Partial Implementation of PASCAL Language  
for a Microprocessor-based Computer System

Joaquin C. Gracida  
Major, United States Marine Corps  
B.S. University of Idaho, 1966  
M.A. Pepperdine University, 1976

and

Robert R. Stilwell  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1972

The design and partial implementation of the PASCAL programming language for use on a microprocessor-based system is described. The framework for the implementation is comprised of two subsystems, a compiler which generates code for a hypothetical zero-address machine and a translator that generates code for the target 8080 microcomputer. The portions of the system which are implemented are written in the PL/M programming language to run in a diskette-based environment with at least 32K bytes of memory.

Master of Science in  
Computer Science  
June, 1978

Advisor: Gary A. Kildall  
Computer Science  
Department

## Experiments in Demonstrating the Correctness of Software

Carl Warren Monk, Jr.  
Lieutenant Commander, United States Navy  
B.S., United States Naval Postgraduate School, 1975

This thesis was undertaken to examine the postdevelopment process of verifying the correctness of software programs, specifically to evaluate the effectiveness and practicality of several proposed methods of verification. Of interest were the degree to which utilization of a given method can be said to demonstrate correctness and the feasibility for general use of that method. The method of research was to study current literature concerning software testing and formal proofs of correctness, select a well-documented program of intermediate size for experimentation, apply selected verification methods to that program, and finally to compare the results of the several experimental demonstrations of correctness. The experiments conducted included a proof of correctness and dynamic testing with test data cases selected by a condition table method, by path analysis, and by structural decomposition of the program.

Master of Science in  
Computer Science

September 1978

Advisor: N. F. Schneidewind  
Department of  
Computer Science

MICRO-COBOL  
A Subset of  
Navy Standard HYPO-COBOL  
for Micro-Computers

Philip Russell Mylet  
B.S., Pennsylvania State University, 1967

A MICRO-COBOL interpretive compiler has been implemented on an 8080 micro-computer based system running under CP/M. The implementation is a subset of ADPESO standard HYPO-COBOL in that the interprogram communication module has not been included. HYPO-COBOL provides nucleus level constructs and file options from the ANSI COBOL package along with the PERFORM UNTIL construct from a higher level to give increased structural control. MICRO-COBOL can be executed on an 8080 or Z-80 micro-computer system with 16K of memory. Although largely completed and tested, all features are not implemented. File I/O features have not been tested and the numeric edit instruction has not been implemented in the interpreter.

Master of Science in  
Computer Science  
September 1978

Thesis Advisor: G. A. Kildall  
Computer Science  
Department

A REAL-TIME OPERATING SYSTEM  
FOR  
SINGLE BOARD COMPUTER BASED  
DISTRIBUTED  
NAVAL TACTICAL DATA SYSTEMS

by

Wolfgang Niemann  
Lieutenant, Federal German Navy

The microprocessor revolution has produced a capable computer on a single printed circuit board.

The design and development of a real-time operating system for a distributed system of Single Board Computers is presented in this paper.

There are user manuals and program descriptions for the operating system, a debug module, a CRT module and a line printer module.

The operating system has been developed for a Multibus system with three INTEL Single Board Computers SBC80/20-4 and 64K bytes of common memory.

The system has been designed specifically for Naval Tactical Data Systems applications and the feasibility of such applications are evaluated with respect to currently available Single Board Computers and with respect to Single Board Computers that should be available in the near future.

Master of Science in  
Computer Science  
June 1978

Advisor: Professor U. R. Kodres  
Department of  
Computer Science

A Design for a  
Function-Descriptive Programming Language

Jerry Gregory Paccassi II  
Major, United States Marine Corps  
B.M.E., University of Santa Clara, 1967

and

Carl Eric Wick  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1970

A design for a function-descriptive programming language is described. The language is based upon a software design model which uses the process of abstraction and successive refinement in problem solving. The resulting programming language provides mechanisms and structures conducive to language extension, ease of program development and enhancement of software reliability. A system's library expands the capability of the base language to satisfy the needs of a user or user group. The user, therefore, does not need to carry the burden of those features of the language which he does not use. Because of its potentially small size, the translator or compiler of the base language may be feasibly implemented on microcomputer developmental systems.

Master of Science in  
Computer Science  
June 1978

Thesis Advisor: U. R. Kodres  
Computer Science  
Department



A USER'S GUIDE FOR THE  
RITA PRODUCTION RULE SYSTEM

Thomas Early Warren  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1973

Interactive computer systems have traditionally communicated with the sophisticated computer user through a precise computer language. That language involved numerous control structures. Hardware costs and technology trends have excited a new breed of computer user. They, however, have lacked the sophistication and technical background to use most of the currently designed computer systems. In an attempt to meet the needs of the new breed of computer-naive user, The Rand Corporation has developed the Rule-directed Interactive Transaction Agent (RITA) system. RITA has used production systems and an English-like grammar to simplify program control structures and to communicate with the computer-naive user in a language of familiarity. A tutorial document has been developed to support the computer-naive user in using the RITA system.

Master of Science in  
Computer Science  
June 1978

Advisor: Gary K. Poock  
Operations Research  
Department

# INSTRUCTIONAL SOFTWARE INFORMATION SYSTEM

ATAMAN YILDIRIM  
Lieutenant (JG) Turkish Navy  
Turkish Naval Academy, 1970

This thesis describes the design, implementation and user interface for an Instructional Software Information System (ISIS). The existing volume and increasing rate of growth of computer software production suggests the need for a catalogue procedure to help programmers find existing software to reduce redundant programming.

The purpose of the ISIS is to provide an online software catalogue which does not require either prior instruction or familiarity with keyword lexicons. Using ISIS, a user may record the characteristics of new software, and make searches for existing software by specifying its characteristics. Characteristics are specified by selection from a succession of menus. ISIS is implemented on a PDP-11 computer operating under the UNIX operating system using the INGRES data base management system. It is written in the QUEL query language embedded in the programming language C.

Master of Science in  
Computer Science  
June 1978

Advisor: Stephen T. Holl  
Computer Science  
Department

Low Profile, Circularly Polarized Antenna Design  
for 918 MHz

Trent Coleman Mulkern  
Lieutenant, United States Navy  
B.S.N.E., North Carolina State University, 1971

The U. S. Army's Range Measuring System (RMS) B unit uses an omnidirectional, quarterwave monopole antenna (Beanie) mounted on a helmet for the transfer of range information. The system has demonstrated a general unreliability in successfully establishing two-way communications between the central computer processor and the field units. One possible reason for this unreliability is the hilly terrain and questionable antenna performance (gain and coverage) at the test area.

A circularly polarized, low profile antenna was examined because of its high gain (6-9db), small size and low cost. A test model was fabricated to evaluate the performance of this design compared to the Beanie antenna. Experimental results of the test model supported the theory. Alternative antenna designs and materials are suggested for further study.

Master of Science in  
Electrical Engineering  
June, 1978

Advisor: O. M. Baycura  
Electrical Engineering  
Department

Computer Networks: Analysis and a  
Case Study Design

Ivano de Azevedo Rocha  
Lieutenant Commander, Brazilian Navy  
B.S., Pontificia Universidade Catolica do Rio de Janeiro

Computer networks are the outcome of the combination of computer and data communications technologies. Part I of this thesis presents the background of each one of these technologies and exposes analytically the principles of computer networking in particular. In Part II, a preliminary design is developed for the Naval Postgraduate School (NPS) time sharing system. The study of Part II leads to a comparative analysis of four network architectures which are suitable for satisfying the needs of the NPS. Those architectures are compared in view of the desirable attributes of accessibility, evolvability, modularity, reliability and ease of operation. The communications requirements are derived and technologies for implementation of the communications links are recommended.

Master of Science in  
Electrical Engineering  
and Master of Science in  
Computer Science  
June 1978

Advisors: Norman F. Schneidewind  
Administrative Sciences  
Department  
Donald A. Stentz  
Electrical Engineering  
Department

Approved for public release; distribution unlimited.

Surface Preparations For Enhancement of  
Infrared Surface Current Detection

William David Russell  
Lieutenant, United States Navy  
B.E.E., Georgia Institute of Technology

In order for infrared current detection methods to be useful, surface preparations must be applied to enhance the heat generation and infrared emissivity of the surface. The derivation of the required parameters of surface preparations for metals is presented and comparisons are made between experimentally determined and actual current distributions.

Master of Science in  
Electrical Engineering  
September 1978

Advisor: Robert W. Burton  
Electrical  
Engineering  
Department

A Serial Fiber Optic Data Bus  
for a  
Distributed Microcomputer System

Richard Ernest Schue  
Naval Avionics Center  
B.S., Rose-Hulman Institute of Technology, 1975

The design and development of a serial fiber optic data bus to connect several Intel single board computers in a distributed processing system is described in this thesis. Included are details on the serial bus control and message handling techniques developed for the system. Also included is a complete description of the hardware that was constructed. Commercially available fiber optic components were used in the data bus. The interface software is compatible with a real-time operating system previously developed at the Naval Postgraduate School.

Master of Science in  
Electrical Engineering  
September 1978

Advisor: Uno R. Kodres  
Computer Science Department

IMPLEMENTATION PLANNING FOR UADPS-SP,  
A COMPUTER BASED SUPPLY AND FINANCIAL  
CONTROL SYSTEM

Donald C. Bohannon  
Lieutenant, Supply Corps, United States Navy  
B.A., University of Louisville, 1970  
and

Robert C. Allison  
Lieutenant Commander, Supply Corps, United States Navy  
B.S., Western Carolina University, 1966

Since its inception in 1963, the Uniform Automated Data Processing System for Stock Points (UADPS-SP) has grown steadily both in the scope of supply, accounting, and data processing functions it performs and in the numbers and types of activities it services. The basic purpose of this thesis is to provide guidance to prospective UADPS-SP customers on the preparations required for successful conversion of their local supply and accounting operations to one of the centrally-designed systems provided by the Fleet Material Support Office (FMSO) under the direction of the Naval Supply Systems Command (NAVSUP).

Master of Science  
in Management  
June 1978

Advisors: J. W. Creighton  
J. D. Buttinger  
Administrative Sciences  
Department

## Enhancement of Promotional Potential: A Hypothesis

Robert A. Brochu  
Commander, Supply Corps, United States Navy  
B.S.I.E, Northeastern University, 1961

Management literature has typically stressed abilities, learned skills and traits as characteristics which possessed, will ultimately lead to promotion. The author hypothesizes that because promotions are granted by superiors and organizations, it is their views of promotion potential that are germane to an individual's opportunity. Furthermore, the importance of the superior and the organization to the promotion process is directly related to the level of the manager seeking advancement. Two hypotheses are explored, which if confirmed, would help an individual enhance his promotion potential. Industry might utilize the same hypotheses to examine the merits of its promotion criteria.

Master of Science in  
Management  
September 1978

Advisor: J. W. Creighton  
Department of Administrative Sciences

Co-Advisor: Stephen Laner  
Department of Administrative Sciences



Workforce Planning Models For  
The Naval Air Test Center

Robert Stratton Buffum  
B.S.A.E., Wichita State University, 1958  
B.S.E.E., Oklahoma State University, 1961

Continuing pressure to maximize the utilization of resources at all levels in public sector organizations invites the use of management science techniques in the development of strategic and medium range plans and policies. When both the number of constrained resources and the projects to which those resources must be distributed are large, management decision-making can be aided by reducing the number of alternatives through the implementation of an optimal decision model. Three resource allocation methods are presented for the Naval Air Test Center; the present incremental method; a capital budgeting method allocating one constrained resource in a satisfying solution; and an allocation model that allows conversion of manpower resources from one labor function and type to another through training, hiring, substitution of contracting. The latter model also includes constraints on capital investment and aircraft utilization in the selection of an optimum portfolio of projects over a time horizon of four years.

Master of Science in  
Management  
September 1978

Advisor: G.G. Brown  
Operations Research  
Department

A NON-PARAMETRIC ANALYSIS OF THE HRM DATA

by

William L. Carter  
Lieutenant, United States Navy  
A. A., University of Florida, 1969, B. S., Livingston  
University, 1971

Lawrence L. Yeatman  
Lieutenant, United States Navy  
B. A., University of Texas, 1971

This thesis provides a statistical analysis of historical HRM data in an attempt to determine if significant positive trends exist. Non-parametric statistical techniques using rank-ordering concepts were used for the analysis.

Analysis failed to show the trends predicted by the literature on survey-guided development. No significant overall trends were detected by any of the statistical tests used. A conclusion that no significant changes have occurred in Navy attitudes as the result of efforts by the HRMSS was considered suspect. The authors discussed the possible explanations for the discrepancy between the conceptual prediction and the observed results.

In conclusion, the analysis was not able to reject the null hypothesis. Possible areas of future research are presented for consideration by interested parties.

Master of Science in  
Management  
June 1978

Thesis Advisors: Cdr. C. B. Gustafson  
Lcdr. R. L. Forbes  
Administrative Sciences  
Department

## An Analysis of Service Contracts and Their Administration

Terrence A. Conner  
Lieutenant, SC, United States Navy  
B.A., LaGrange College, 1969

The military services are utilizing service contracting to alleviate the problems of personnel ceilings drawdowns and tight budgetary controls. Due to poor definition of the Statement of Work and a general misunderstanding of OMB Circular A-76 and a liberal interpretation of the Service Contract Act by the Department of Labor, service contracting and the administration of service contracts must be considered poor. Recent attempts by the Navy and Air Force through their COTR and TRCO concepts to alleviate some of the problems in service contract administration have had varied results.

This thesis will examine the problems that presently hinder service contracting and the administration of service contracts. A new approach, job analysis, will be recommended for developing the Statement of Work and the Quality Assurance Surveillance Plan. Job analysis involves systematic analysis of the function to be contracted. First a step-by-step review of the requirement to be contracted is conducted. The goal of this review is to arrive at specific output services with corresponding standards associated with the contracted service.

Master of Science in  
Management  
September 1978

Advisor: K. L. Patterson  
Administrative Sciences  
Department

Integrated Accounting and Disbursing (IDA),  
Its Development and Implementation

Michael Robert Cooper  
Lieutenant, United States Navy  
B.A., University of Washington, 1972

and

Joseph Sharp Littleton, III  
Lieutenant, United States Navy  
B.S., University of Virginia, 1972

This thesis describes the development and implementation of the Department of the Navy's Integrated Accounting and Disbursing (IDA) system. The pre-IDA accounting and disbursing systems are presented and their shortcomings are identified. The progress of IDA is traced from its conceptual foundation through the detail design stage. Various forces which significantly influenced the final design have been identified. Overall IDA implementation to date is examined along with a detailed view of implementation efforts in the San Diego area.

Master of Science in  
Management  
September 1978

Advisor: J. F. Owens  
Administrative Sciences  
Department

The Financial Impact of Shipbuilding  
Claims upon Litton Industries

Jerome Vincent Diekemper  
Lieutenant Commander, United States Navy  
B.S., University of Illinois, 1967

This paper analyzes the financial impact of shipbuilding claims on Litton Industries and its Ingalls Shipbuilding Division. It begins by reviewing the changing atmosphere within the U. S. shipbuilding industry from the late 1960s to the present and then considers how these changes influenced some of the major operational decisions made by Litton. The thesis continues with a discussion of eight major milestones which have occurred during the past ten years of dealings between the Navy and the corporation. These milestones reflect an assessment of the events which impacted upon the financial stature of the company. Although emphasis is placed upon the LHA claim, other claims are presented when pertinent. Finally, there is provided a discussion of lessons learned with attendant suggestions on preventing recurrences of the financial hardships suffered by the Navy and Litton/Ingalls.

Master of Science in  
Management  
September 1978

Advisor: Leslie Darbyshire  
Department of  
Administrative Sciences

Case Study: FFG-7 Class Ship

Frederick Bigelow Easton  
Lieutenant, Supply Corps, United States Navy  
B.S., Univeristy of North Carolina at Chapel Hill, 1969

Estimating the cost of a major weapons system is an extremely complex process involving interrelationships between a number of organizations. This thesis is an examination of the events surrounding the cost estimating effort involved for the FFG class ship using a case study approach. The case discusses concepts involved in the FFG procurement which include the high-low mix, design to cost, life cycle costing, lead ship/follow-on ship procurement, fly before buy, independent cost estimating, and learning curve theory. A teaching note is provided to stimulate classroom discussion and analysis of the major areas covered in the case. Questions which may be used in classroom discussion or for assignment and the essentials of learning curve theory are also provided.

Master of Science in  
Management  
June 1978

Advisor: J.D. Buttinger  
Department of  
Administrative Sciences

Acquisition Planning  
for  
Tactical Avionics Systems

Cleveland Duane Englehardt  
Lieutenant Commander, United States Navy  
B.S.E.E, San Jose State College, 1968  
M.S.A.E, Naval Postgraduate School 1977

This thesis examines the use of microcomputer technology in tactical avionics systems and its impact on the procurement process of associated hardware and software. The rapid expansion of implementation of large scale integrated circuits in avionics systems aboard tactical military aircraft and missile systems has resulted in some serious potential problems in the areas of development, maintenance and acquisition of microprocessor-based systems and software. These problems are identified and discussed and proposed recommendations are made to lessen their undesirable long-range effects.

Master of Science in  
Management  
June 1978

Advisor: U. R. Kodres  
Department of  
Computer Science

An Analysis of the Constraints  
on the Activation of the National Defense Reserve Fleet  
in a Non-Mobilization Contingency

William Barton Evers  
Lieutenant, United States Navy  
B.S., North Carolina State University, 1972

The study analyzes the problems associated with the activation of a substantial number of ships from the National Defense Reserve Fleet (NDRF), this country's sole source of reserve shipping. After a review of past NDRF contributions, a discussion of its present capability is presented. Five major areas which would serve to constrain future activation efforts are then examined, including fleet material condition and drydock availability. Next, these areas are analyzed in the context of a non-mobilization scenario in an attempt to determine the response capability of the NDRF. In the final chapter, conclusions are drawn regarding the NDRF's ability to respond to a fast-breaking contingency in the foreseeable future.

Master of Science  
in Management  
September 1978

Advisor: J. D. Horton  
Department of  
Administrative Sciences



A FLEXTIME FEASIBILITY ANALYSIS MODEL  
FOR  
PRODUCTION ORIENTED ORGANIZATIONS

Stewart Greaves Folkman  
Lieutenant, United States Navy  
B.S., Utah State University, 1970

and

Kenneth David Lantta  
Lieutenant, United States Navy  
B.S., Montana State University, 1971

The objective of this thesis was to develop a flexitime feasibility analysis model for production oriented organizations. Current literature on flexitime was reviewed to give insight into the background and growth of the flexitime concept. Laws and regulations restricting full utilization of the flexitime system are examined and discussed, as well as the common fears and misconceptions of management, supervisors and organized labor. Further clarification on analyzing the feasibility of flexitime was gained from interviews with administrators, managers, and employees in organizations utilizing flexitime. In those organizations where genuine employer - employee trust and cooperation abound, the authors noted that few difficulties were encountered in applying or administering the concept of flexitime. Flexitime is not a cure for poor management - labor relations. However, given an organization where progressive management techniques are in practice, flexitime can result in greater employee motivation and higher productivity.

Master of Science in  
Management  
June 1978

Advisor: J. W. Creighton  
Administrative  
Sciences Department

LETHERED BALLOON TRANSPORT SYSTEM:  
A PROPOSAL

William Frederick Graeter II  
Lieutenant Commander, Supply Corps, United States Navy  
B.S., Stephen F. Austin State University, 1964  
M.Ed., Boston University, 1972

This report documents the impact of containerization on amphibious warfare, reviews the state of current lighter-than-air technology, traces the development of the commercial Balloon Transport System, summarizes the military development efforts at discharging containers using a balloon transport system, and makes specific recommendations for the implementation and further development of a Navy Balloon Transport Facility (NBTF) which is designed to remove containers from non-self-sustaining container-ships, transport them to the shore and deposit them in staging/handling areas inside the amphibious area of operations.

Master of Science  
in  
Management  
June 1978

Advisor: John W. Creighton  
Administrative Sciences  
Department

RATE STABILIZATION AT NAVY INDUSTRIAL FUND  
RESEARCH, DEVELOPMENT, TEST AND EVALUATION ACTIVITIES

Donald Truman Green  
B.S., Abilene Christian University, 1966

The 13 Navy industrially funded RDT&E activities implemented rate stabilization in October 1976 under protest. With rate stabilization, DoD industrially funded activities bill their customers on the basis of stabilized billing rates that cannot be adjusted during the fiscal year as costs change. A basic objective is to allow customers to plan for cost escalation during a fiscal year by using rates established up to 15 months in advance of the fiscal year start.

This thesis examines the operating results of rate stabilization at NIF RDT&E activities 18 months after implementation, in order to determine the degree of success in meeting rate stabilization objectives. Questionnaires and Financial Statements were used to gain research data.

Conclusions are that the RDT&E activities and their customers have opinions that rate stabilization entails more disadvantages than advantages. Rate stabilization is not meeting the objective for which it was implemented since a minority of the RDT&E customers use rates in budgeting.

Master of Science in  
Management  
June 1978

Advisor: J. C. Tibbitts, CDR  
Administrative Science

Budgeting for Repairable Secondary Items  
at the  
Naval Electronic Systems Command

Ryan L. Hanson  
Lieutenant, Supply Corps, United States Navy  
B.S., University of Minnesota, 1970

The Naval Electronic Systems Command (NAVELEX) manages both principal and repairable secondary items but has not been able to obtain funding for procuring new secondary items to replace those which are no longer repairable. It has also been only able to obtain level funding for repairs. It is estimated that this has resulted in an annual shortfall of \$18 million. This study recommends that determination of secondary items to be managed by NAVELEX be postponed until provisioning of the parent principal item. The budget for repair pipeline and initial attritions of these secondary items could then be justified as a spares procurement line item. The use of the stratification program of the Naval Supply Systems Command (NAVSUP) is recommended for budget justification for both post-provisioning replenishment procurements and repairs of these secondary items.

Master of Science in  
Management  
September 1978

Advisor: Alan W. McMasters  
Department of  
Administrative Sciences

## Organizational Decision-Making

Gregory L. Harm  
Captain, United States Marine Corps  
B.A., University of South Dakota, 1971

This thesis develops a heuristic approach to organizational decision-making by synthesizing the classical, neo-classical and contingency approaches to organization theory. The conceptual framework developed also integrates the rational and cybernetic approaches with cognitive processes underlying the decision-making process. The components of the approach address the role of environment in organizational decision-making, develop a typology of decision situations, display the communication of decision dimensions and examine the role of critical variables in the decision-making process. The development of the approach is supported by its application to a short case-study.

Given the existing difficulty in evaluating both commercial and public policy formulation and decision outcomes, the conceptual framework developed is intended to be a useful tool descriptively, predictively and prescriptively for analyzing the organizational decision-making process.

Master of Science in  
Management  
June 1978

Advisor: E. J. Laurance  
National Security  
Affairs Department

Navy Supply Support for Foreign  
Developed and Manufactured Equipment

Dewey Arnold Holley  
Lieutenant Commander, Supply Corps  
United States Navy  
B.S., Tusculum College, 1965

The United States Navy currently owns 532 foreign-produced equipments and this number is expected to increase as a consequence of U. S. commitments to NATO. Supply support of these equipments is vital to the missions of the Navy. This thesis begins with an examination of the international cooperative programs between the United States and other NATO nations which provide the United States Armed Services with foreign-manufactured equipments. The current procedures of the U. S. Navy's Ship Parts Control Center for determining the initial and follow-on supply support for both U. S. and foreign-manufactured equipments is then reviewed. The problems associated with the support of the 532 foreign equipments are identified. Finally, suggestions for improvements in the present support procedures are made.

Master of Science in  
Management  
September 1978

Thesis Advisor: A.W. McMasters  
Administrative Sciences  
Department

Cost Benefit Analysis of the  
Department of Defense Family Housing Program

Terry Owens Klein  
Lieutenant, United States Navy  
B.S., Ohio State University, 1971

This thesis examines the costs and the benefits of alternative approaches to managing DOD family housing assets. The two approaches examined are Variable Housing Allowance and Fair Market Rental. These two alternatives seek to alleviate the inequities of the present housing system in dramatically different ways. While a Variable Housing Allowance would be more advantageous to the service member, a Fair Market Rental system is being promoted within Congress and the Executive Branch. An approach which combines elements of both the Variable Housing Allowance and the Fair Market Rental is recommended as the most viable and equitable alternative to the present family housing system.

Master of Science in  
Management  
September 1978

Advisor: Joseph F. Owens  
Department of  
Administrative  
Sciences

A Process for Development of  
Recruit Training in Indonesian Navy

A. KUNTJORO  
Major, Indonesian Navy  
M.S., Gajah Mada University, 1966

It is known that there is a relationship between the quality of military persons and their recruit training. This thesis examines problems of adjustment encountered by new recruits entering the military services. Factors affecting adjustments such as the recruit background characteristics, the image of the military, the recruit training staff and environment, and the recruiting process are discussed. It is demonstrated that additional knowledge can be gained by ascertaining what motivates military personnel to make a career of the military service. A feasible systematic process is proposed for the development of recruit training.

Master of Science in  
Management  
June 1978

Advisor: R. A. McGonigal  
Administrative Sciences  
Department



Organizational Development: Environmental Pressures,  
The Military Setting, and the Ultimate Test

William Don Langford  
Captain, United States Army  
B.S., Clemson University, 1968

The three major services, the Air Force, Navy, and Army have generated programs which, in theory employ the technology of Organizational Development. The goals of these OD efforts all purport to improve organizational functioning in the areas of efficiency, effectiveness, and in total combat readiness. Because of their growing size and influence, it is felt to be an appropriate time to evaluate their usefulness. The ultimate test for the effectiveness of a military unit is, of course, under combat conditions. Unfortunately, there is little precedent to say that OD in the military is good or bad under the stress of combat. This thesis provides a contest for looking at OD in the military by analyzing the environmental pressures, the current OD effort, and considers the use of OD under combat conditions. It identifies the likely benefits, the potential dangers of using such a change approach, and makes recommendations on how to accomplish the goal of improving organizational functioning using OD consultants under combat conditions.

Master of Science in  
Management  
June 1978

Advisor: Cdr R. A. McGonigal  
Administrative Sciences  
Department

## CRISIS MANAGEMENT: MYTH OR MONSTER

Steven Michael Lanoux  
Lieutenant, United States Navy  
B.S., Louisiana State University, 1969

Crisis management is defined to be the expansion of the commitments on an organization beyond the capability of its normal resources to respond adequately to all of them. Crisis commitments are imposed with relatively short notice, with vague prioritization, and without the privilege of reclama by the organization. Under conditions of goal conflict and workday extension, the organization and its environment are statically and dynamically modelled to demonstrate the critical nature of the time element in the management of crises. An in-depth analysis of the supporting situational elements within the Navy is conducted. Emphasis is placed on the structure of the Navy bureaucracy and its effectiveness in the unstable environment which the U. S. military faces. The contribution of bureaucracy to the institutionalization of crisis management as a standard procedure is examined. The sociological norms of individual behavior which are operant in maintaining the crisis management standard are also emphasized. Recommendations for further research and for interim actions to remedy this dysfunctional symptom are proposed.

Master of Science in  
Management  
June 1978

Advisor: CDR R. A. McGonigal  
Administrative Sciences  
Department

Management Control  
in  
Weapons Systems Acquisition

Joseph P. Losquadro  
Lieutenant Commander, Supply Corps, United States Navy  
B.A., Colgate University, 1964

This thesis examines the management function from the perspective of a Navy Weapons Acquisition Program Manager. It is hypothesized that control is a key variable to success. To be in control, a program manager must make significant decisions in the process of fulfilling his basic mission. To be effective, those decisions must be informed decisions.

The first half of this thesis effort establishes a conceptual base for the subsequent development of a practical framework for management control in an ongoing acquisition project. Chapters two and three report the results of an analysis of the literature on control and information management. The conceptual study concludes with an examination of two theoretical frameworks, a brief look at the Navy program manager and how he fits into these two frameworks, followed by a summary description of three control systems used in the Navy today.

The second half of the effort presents a proposal for a management control system for the FIREBRAND Missile acquisition project, and a model for future efforts in similar circumstances.

Master of Science  
in Management  
September 1978

Advisor: A. C. Crosby  
Department of  
Administrative Sciences

An Analysis of the Navy Material Transportation Office  
Management Indicator Report as a Management  
Information System Product

Gerald E. Mate  
Lieutenant Commander, United States Navy  
B.F.A., University of Illinois, 1964

The Navy Material Transportation Office (NAVMTO) was submitting a Management Indicator Report to Commander Naval Supply Systems Command (NAVSUP) as an element of a Management Information System (MIS). The Management Indicator Report is examined for the purpose of determining its effectiveness as a viable MIS product and is found to be lacking. An approach to develop an effective MIS for the NAVSUP/NAVMTO interface is provided. Emphasis is placed upon aligning the MIS with missions and functions assigned to NAVMTO. A proposed sample questionnaire is provided which could serve as a tool during the planning phase of the MIS development.

Master of Science in  
Management  
September 1978

Advisor: J. M. Shiels  
Department of  
Administrative  
Sciences

An Analysis of  
Management Control Effectiveness  
at Naval Supply Systems Command  
Procurement Organizations

Felton Miller  
Lieutenant, United States Navy  
B.S., The University of Tennessee at Knoxville, 1971

The wide and complex scope of the Navy procurement environment and the increasing pressures to make defense operations more efficient necessitate a critical review of the Navy's approach to managing field procurement organizations. The implications are that the planning and control functions need renewed impetus to enhance good management practices and foster an atmosphere conducive to exercising sound judgement in the decision-making process.

Managers of Navy field procurement organizations need management aids which facilitate procurement planning, contract award, and managerial control and evaluation functions.

The most critical aspect of this process is the development and implementation of an effective management control system which provides adequate information to all levels of the procurement hierarchy. This paper suggests an approach for designing such a framework.

Master of Science in  
Management  
September 1978

Thesis Advisor: J.M. Shiels  
Administrative Sciences  
Department

A NEED FOR CHANGE  
A Study of the  
Attitudes of the United States Naval Officer  
toward HRM

Frank L. Mixner  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1965

This study addresses the attitude of the U.S. Naval Officer toward Human Resource Management (HRM) and specifically the identification of areas in which to work for improvement of this attitude. This perceived attitude of resistance is an area of concern for many people at all levels. The purpose of this thesis was to determine the HRM image in order to identify problem areas and provide direction for improving the image of HRM to facilitate attitude change.

The approach taken was based on the consistency theory of attitude change, primarily the basic theories of Heider, Festinger, and Osgood and Tennenbaum. A survey questionnaire was developed and distributed to the naval officers who were students at the Naval Postgraduate School. The questionnaire asked for the degree or intensity that specific adjectives described the HRM specialist and HRM program. Further analysis combined with Osgood, Suci, and Tannenbaum's concept of semantic space resulted in specific directions for improvement of the image of HRM and therefore reduction of the attitude of resistance by naval officers.

Master of Science in  
Management  
June 1978

Advisor: R. A. McGonigal  
Administrative  
Sciences Department

The Development of a Fully Automated Procedure to  
Produce a Technology Transfer Directory of People  
to Facilitate the Linker Function in the  
Technology Transfer Process

Richard Walter Modrowski  
Lieutenant Commander, Supply Corps, United States Navy  
B.A., University of Notre Dame, 1965

Michael Milton Henderson  
Captain, United States Marine Corps Reserve  
B.A., University of California, 1969

The process of Technology Transfer is dependent on personal communication between individuals knowledgeable in new technology and who are willing to share this knowledge with others for the purpose of increasing the benefits to mankind. This work facilitates the communication process by developing a fully automated system to produce a directory listing of people who comprise this category. Furthermore, the system's computer programs constitute a model by which the process of gathering, storing, extracting and displaying various types of information is made possible.

Master of Science in  
Management  
June 1978

Advisors: John W. Creighton  
James A. Jolly  
Department of Administrative  
Sciences

Human Resource Accounting: Its Application  
in Human Resource Management

Bruce Anthony Joseph Puccini  
Lieutenant, United States Navy  
B.S., Eastern Washington State College, 1971

The concept of Human Resource Accounting was developed to give management an accurate estimation of the value of people to the organization. This is of major concern to the Department of Defense today. In this thesis, an alternative to the traditional methods of accounting for human worth has been proposed. The Expected Realizable Value Theory as developed by Eric Flamholtz has been used to assess the worth of the individual to several military organizations. This model was also used to provide a cost-benefit analysis regarding: (1) the Navy's current up or out policy, (2) personnel costs relating to new construction cost overruns, (3) adjusting personnel costs in regard to the fluctuating productivity of a command, and (4) the evaluation of detailing and assignment procedures. In the Flamholtz model, the expected realizable value is comprised of two variables: (1) the probability that a person will remain with the organization during his expected service life, and (2) a person's conditional value, which is a multi-dimensional



variable comprised of three factors: promotability, transferability, and productivity. By adjusting this model to account for other factors, an alternative to current detailing and assignment procedures was evaluated. Further research drawing upon several disciplines including, but not limited to, accounting, economics, behavioral science, and management science might help provide a workable theory of human resource value that could be designed to meet a variety of needs within the Department of Defense.

Master of Science in  
Management  
June 1978

Advisor: CDR R. McGonigal  
Administrative Science  
Department

Use of Intelligent Terminals at the Battalion/Squadron Level  
for Manpower Management System Reporting in the FMF

Larry D. Rannals  
Major, United States Marine Corps  
BBA, Texas A & M University, 1965

The Marine Corps' Manpower Management System (MMS) is a semi-automated information system which uses inputs from several sources to provide personnel-management-oriented outputs to all echelons of command throughout the Fleet Marine Forces (FMF). Preparation of input data is done primarily in a manual mode and requires extensive use of manpower at the lower echelons. Present MMS automated support for FMF units has been characterized as inflexible, highly centralized, inadequate during deployment, and non-responsive to lower echelon information needs.

This study explores a means of using an intelligent terminal system and source data automation to accomplish MMS reporting functions at various echelons within the FMF down to the Battalion/Squadron level; and the use of such a system to provide command management functions at all levels with an increased flexibility and timeliness with respect to the availability of personnel information. Benefits/advantages of such a system over current MMS reporting, processing, and distribution methods are examined. Concepts for employment of an intelligent-terminal system in both the garrison and deployed environments are explored. The prospect for reducing administrative personnel requirements needed under such a system is discussed.

Master of Science in  
Management  
June 1978

Advisor: Ronald J. Roland  
Computer Science  
Department

An Analysis of Proposed Contractor  
Provisioning of the F-18 Aircraft

Kenneth H. Rasmussen  
Commander, SC, United States Navy  
B.S., Naval Postgraduate School, 1974

The initial provisioning of the F-18 aircraft by the prime contractor in lieu of by the Aviation Supply Office, Philadelphia, Pa. has been proposed. This thesis provides an analysis of the Provisioning Requirements Statement (PRS) prepared to contractually obligate the prime contractor to perform the provisioning. Externalities affecting the move toward contractor provisioning are discussed. The provisioning of the F-18 by the contractor is concurred with in principle, but it is recommended that the PRS be reviewed to ensure clarity and full understanding of specific PRS paragraphs as identified in the analysis.

Master of Science in  
Management  
September 1978

Advisor: A. C. Crosby  
Department of  
Administrative Sciences

Project Management Training in the Army  
and the Systems Acquisition Management  
Curriculum at the Naval Postgraduate School

Russell Norman Robinson  
Captain, United States Army  
B.S., Pennsylvania Military College, 1969  
M.S., Naval Postgraduate School, 1977

A discussion is presented of the Project Manager's Environment, Project Manager Characteristics and the education pertinent to project management. This discussion is used as a basis for study and comparison between current educational resources used in the development of Army Project Managers and the Systems Acquisition Management Curriculum at the Naval Postgraduate School. The institutions studied included: the U.S. Army Logistics Management Center, the Defense Systems Management College, the U.S. Army War College, the Industrial College of the Armed Forces, the U.S. Army Management Engineering Training Activity and the Naval Postgraduate School.

It is concluded that the Systems Acquisition Management Curriculum at the Naval Postgraduate School offers a unique opportunity to upgrade the education of Army Project Managers. It is recommended that the Systems Acquisition Management discipline be included in the Army's requirements for advanced education and that the Systems Acquisition Management Curriculum be included in the educational development of Army Project Managers.

Master of Science in  
Management  
June 1978

Advisor: J. W. Creighton  
Administrative Sciences  
Department

AN ANALYSIS OF CURRENT ORGANIZATIONAL  
DEVELOPMENT EFFORTS IN THE UNITED STATES COAST GUARD

CLIFFORD LEE SAMUEL

Lieutenant, United States Coast Guard

B.A. Psychology San Diego State University

The Coast Guard, like the Department of Defense services, is faced with the problems of system-wide social change and the need to manage the integration of individual and organizational goals. A comparative/descriptive analysis of preliminary and institutionalized OD efforts by the various U. S. Armed Forces to respond to these social pressures is presented. The purpose of this study is to provide inputs and recommendations for general policy use by Coast Guard planners, in light of the Defense services' efforts, regarding the feasibility, establishment, and management of a Coast Guard OD program.

Master of Science in Management  
September 1978

Advisor: R. L. Forbes, Jr.  
Administrative Sciences  
Department

The Effects of the Stock Coordination Program  
upon Inventory Management at the  
Naval Electronic Systems Command

Robert N. Seebeck  
Lieutenant, Supply Corps, United States Navy  
B.S., Georgia Institute of Technology, 1972

This study is a continued effort to assist the Naval Electronic Systems Command (NAVELEX) in identifying and transferring items to the Ships Parts Control Center (SPCC) in response to reemphasis by the Chief of Naval Material on stock migration from the Hardware Systems Commands (HSC) to the Naval Supply Systems Command (NAVSUP). Analyses conducted included a revision and expansion of earlier computer analysis of demand data for items managed by NAVELEX, study of the Stock Coordination Program and the criteria by which items are considered for transfer to NAVSUP or retention at an HSC, and the effects on inventory management of stock migration from NAVELEX to SPCC. Definitive recommendations for retention/transfer criteria were not achieved within the time of this research, but the analysis performed sustained earlier recommendations that a majority of items should be transferred from NAVELEX to SPCC.

Master of Science in  
Management  
June 1978

Advisor: A. W. McMasters  
Department of Administrative  
Sciences

Development of a Proposed User's Manual  
for the  
Uniform Management Report (UMR) System

Earl Lee Smith, Jr.  
Lieutenant, Civil Engineer Corps, United States Navy  
B.S.M.E., University of California, Davis, 1968

This thesis presents a proposed user's manual to be utilized in conjunction with the Uniform Management Report (UMR) System developed under the direction of the Comptroller of the Navy. The Uniform Management Report (UMR) System was developed as a modification to the Resources Management System (RMS) to improve management report utility. The user's manual development is an integral part of the UMR System implementation providing comprehensive instruction and guidance for management.

Data for this thesis was gathered from literature, letters, reports, directives, and publications relating to financial management and reporting. Telephone interviews were conducted with Department of the Navy personnel experienced in utilizing management reports to clarify material included in the user's manual.

This thesis was sponsored by the office of the Navy Comptroller (NAVCOMPT NCB).

Master of Science in  
Management  
June 1978

Thesis Advisor: J.C. Tibbits  
Commander, CEC, USN  
Administrative Sciences  
Department

Career-Path Classification For Professional  
Scientific and Engineering Personnel

Donald Norman Spangenberg  
B.S. Drexel Institute of Technology, 1950  
M.S. Lehigh University, 1951  
S.M. Massachusetts Institute of Technology, 1955

The Navy has a vested interest in the development of the career paths of its military and civilian personnel. Of particular interest is the career-path classification of the professional scientific and engineering employees of the Navy's laboratories. This research is an exploratory study designed to develop a career-path classification tool for managers to use in conjunction with other tools and data when making a variety of personnel decisions. The benefits of such a tool are described. A test instrument composed of the Kuder Preference Record-Vocational and the Kuder Preference Record-Personal was selected. Data were collected from 39 Navy professional scientific and engineering personnel, who were classified by their supervisors as being either "Administrative", "Managerial", or "Technological" professionals. Twenty-nine participants were selected to form a validation group. Three analyses were made and a career-path classification tool was developed. The feasibility of using the tool and the validity of it were demonstrated using the remaining ten participants as cross-validation group. A success rate of 60% was demonstrated. This compares with an expected success rate of 33% by chance and is statistically significant at the 0.077 level.

Master of Science in  
Management  
September, 1978

Advisor: P. A. Weitzman  
Administrative Science



An Analysis of Organization  
Development Consultant Skill Requirements

James David Spurgeon, III  
Captain, United States Air Force  
B.S., United States Air Force Academy, 1970

The United States Air Force Leadership and Management Development Center (LMDC), Maxwell Air Force Base, Alabama, was created in 1975 at the direction of Chief of Staff General David C. Jones. Since that time, the consultative services and techniques of the LMDC traveling teams have expanded and matured, as have those of Army, Navy, and civilian organization development (OD) agencies. Major revisions are planned to occur in 1978 to both the nature and scope of LMDC activities. Essentially there will be a shift from a technology based on Schein's Process Consultation Model to a more data-based technology influenced by Bowers' work with survey-guided development. This study was undertaken to take advantage of the maturing technologies in the civilian sector and in the other Services, and provide to the LMDC a synthesized listing of the skills required of an OD consultant. The Kolb-Frohman model of the process of planned change provided the structure for data aggregation and the synthesized skills listings. Additionally, the process of Technology Transfer is discussed as it applies to this study and its future utilization. The value of this study lies in its concise listing of skills, knowledges, and traits required of a practicing OD consultant.

Master of Science in  
Management  
June 1978

Thesis Advisor: J.W. Creighton  
Administrative Sciences  
Department

Unit Training Costs as a Part of Life Cycle Cost:  
A Methodology

Grover Frank Thompson  
Major, United States Army  
B.A., Iowa Wesleyan College, 1973  
M.B.A., St. Louis University, 1977

James Marion Allen  
Captain, United States Army  
B.S., The Citadel, 1969

This paper examines the unit training costs, defined herein as company and battalion level training, associated with the introduction of a new weapon system into the Army inventory. The Army Life Cycle Cost Model does not address unit training costs, and accordingly there is a significant cost during the acquisition process that is not recognized. Recommendations are included for a means to arrive at life cycle cost figures that include unit training and also enable unit commanders to anticipate training requirements generated by new weapon systems.

Master of Science in  
Management  
June 1978

Advisor: P.M. Carrick  
Department of  
Administrative Science

## ESCALATION CLAUSES IN SHIPBUILDING CONTRACTS

by

John Demetrius Vellis, II  
Lieutenant Commander, Supply Corps, United States Navy  
B.S., United States Naval Academy, 1968  
M.S.A., The George Washington University, 1977

Historically, shipbuilding contractors have been damaged financially while executing long term fixed price contracts during periods of rapidly rising prices. Escalation provisions have been incorporated in U.S. Navy shipbuilding contracts in an attempt to neutralize this adverse effect of inflation upon contractors. This thesis is an examination of the nature of two escalation clauses utilized by the Naval Sea Systems Command in long term shipbuilding contracts using a case study approach. The case discusses general price increases, characteristics of escalation clauses, the measurement of price changes, and the use of price indices. The importance of selecting proper indices is stressed by focusing on actual escalation experienced in the DD-963 SPRUANCE Class contract. A teaching note is provided to assist in classroom discussion, and questions are also provided which may be used in classroom discussion or for out-of-class assignment.

Master of Science  
in Management  
June 1978

Advisor: James D. Buttinger  
Administrative  
Sciences Department

The Development of an  
Optimum Management Plan for the  
Sablefish Fishery of the  
California, Oregon and Washington Coast

Stephen John Wehner  
Lieutenant, United States Coast Guard  
B.S., University of California at Irvine, 1969

Public Law 94-265, the Fishery Conservation and Management Act of 1976, generated requirements for the optimal management of fishery resources of the United States. This thesis examines, from the perspective of a government regulatory agency, the Coast Guard, the management problem facing the Pacific Regional Council in developing a management plan for the sablefish fishery of the California, Oregon and Washington coast. Economic and biological considerations, which make government regulation an apparently desirable social alternative, are reviewed. A review and examination is made of the Act, the preliminary management plan, the sablefish fishery itself, including markets, the Coast Guard relationship to the enforcement of the plan, and the current status of the Councils plan development. Alternatives are developed and critiqued with an orientation towards optimal management of the fishery and indications as to the requisite Coast Guard involvement for enforcement. Conclusions and recommendations are included.

Department of Science in

Thesis Advisor: P.M. Carrick  
Administrative Sciences  
Department

An Analysis of the Amalgamation of the CS and SD  
Ratings in the United States Navy

Larry K. Weittenhiller  
Lieutenant Commander, United States Navy  
B.S., University of Wisconsin, 1965  
M.A., Webster College, 1976

and

Craig C. L. White  
Lieutenant Commander, United States Navy  
B.S., U.S. Naval Academy, 1967

This study examines the impact of the amalgamation of the Navy's former Commissaryman (CS) and Steward (SD) ratings into the Mess Management Specialist (MS) rating. Vehicles used to analyze the impact of the amalgamation include the responses of 6,594 CS, SD and MS personnel to the Navy's Human Resource Management (HRM) survey during the three-year period, 1974-76, and interview data gathered from 60 MS personnel from the San Diego area in early 1978. The amalgamation is also briefly analyzed using the Leavitt socio-technical model of organizational change. Included in the study is a historical view of the role food has played in naval operations and the role of food and food service support systems in the modern naval environment. Having examined the amalgamation from these perspectives, major conclusions are found to include: (1) food service support systems impact heavily on morale, quality of work life, satisfaction, retention and indirectly on mission accomplishment; (2) a true amalgamation of attitudes and perceptions by Filipino and Caucasian MS personnel has not occurred; (3) the HRM survey may be a potentially useful tool to assess and monitor organizational change; (4) MS personnel have a poor self-image; (5) both Filipino and Caucasian racial sub-groups are still experiencing organizational frustration, intercultural conflict and uncertainty as a result of the amalgamation. Recommendations for future direction were divided into rating-specific and Navy-specific categories.

Master of Science in  
Management  
June 1978

Advisor: R. L. Forbes  
Department of  
Administrative Sciences

The Regulation of Transportation--  
An Analysis

Paul Denzil Wells

Commander, United States Navy

B.S., United States Naval Postgraduate School, 1974

This thesis offers a general evaluation and analysis of the process of regulation as it applies to the transportation system in the United States. It traces the development of transportation regulation from its birth as an outgrowth of the Granger laws in the 1870's and 1880's to the present. An evaluation of the agencies responsible for enforcing, interpreting, and applying the regulatory process is included, as well as a discussion of the pros and cons of regulation versus deregulation. Finally, alternatives are offered relative to remedies available to the legislative process to improve current regulatory practices.

Co-Advisor : John W. Creighton  
Administrative Science  
Department

Master of Science in  
Management  
June 1978

Co-Advisor : Robert W. Sagehorn  
Administrative Science  
Department

# Evaluation of Programmed Team Development

## Package for Navy Usage

Bradley Yancey Winsted  
Lieutenant, United States Navy  
B.A., University of Colorado, 1971

A study was performed on the applicability of Task Oriented Team Development (TOTD), a team development programmed workshop training model, for Navy use. All Navy commands are made up of teams of individuals working interdependently for common organizational goals. TOTD is a set of programmed training materials designed to enable work teams at any level of the organization improve their ability to work together. Navy and Coast Guard units were given TOTD in its present form. Time-one and time-two measurement instruments were used with control groups. TOTD was found to be theoretically sound with current team development methodologies, however, it does not lend itself directly to Navy usage in its present form. The results of the study indicate that TOTD needs major modifications for Navy usage. The advantages of its programmed, modular nature, plus the minimum need of consultant or facilitator time make it worth Navy procurement with design changes incorporated. Suggestions for changes are listed in the appendixes of the thesis.

Master of Science in  
Management  
June 1978

Advisor: C. B. Gustafson  
Administrative Sciences  
Department

Lateral Buckling of Beams Without  
Warping Rigidity

Robert Edward Brown  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1968

A procedure is described to determine lateral buckling loads for initially straight beams. Loading and beam geometry may vary along the length. Warping rigidity is not considered. End conditions of considerable generality may be treated. The algorithm depends on solving a convergent sequence of sixteenth order eigenproblems. A computer program implementing this procedure has been developed and is described herein.

Master of Science in  
Mechanical Engineering  
June 1978

Advisor: J. E. Brock  
Department of  
Mechanical Engineering



CASCADE WIND TUNNEL FOR  
TRANSONIC COMPRESSOR BLADING STUDIES

by

Willard Joe Demo, Jr.  
Lieutenant, United States Navy  
B.S., University of Kansas

The design and construction of a small, transonic, cascade wind tunnel are reported. The tunnel is of the intermittent blow-down type, and the initial test cascade models the flow at the rotor blade tips of a single stage transonic compressor at a relative Mach number of 1.4. General programs were developed for the design of round-to-rectangular transition sections and for the computation of supersonic nozzle contours. Complete machine drawings for the important components of the facility are included.

Master of Science in  
Mechanical Engineering  
June 1978

Advisor: R. P. Shreeve  
Aeronautics Dept.

AN EXPERIMENTAL COMPARISON OF ENHANCED HEAT  
TRANSFER CONDENSER TUBING

James H. Fenner  
Lieutenant, United States Navy  
B.S., Miami University, 1973

Ten 15.9 mm (5/8 in.) nominal outside diameter geometrically enhanced tubes of different metals were tested to determine their heat transfer and hydrodynamic performance. Results were compared to smooth copper-nickel tubes. Steam at about 21kPa (3 psia) was condensed on the outside surface of each enhanced tube, horizontally mounted in the center of a dummy tube bank. Each tube was cooled on the inside by water at velocities of 2.7 to 7.6 m/sec (3 to 25 ft/sec).

The overall heat transfer coefficient was determined from experimental data. The inside and outside heat transfer coefficients were determined using the Wilson plot technique. Friction factor in the enhanced section was determined from the cooling water pressure drop.

Enhanced geometries (utilizing pitch, helix angle and groove depth) were found to improve the corrected overall heat transfer coefficient by as much as 2 times that for smooth tubes. Use of enhanced tubes in place of smooth tubes will permit a decrease in condenser tube surface area from 17 to 53 percent for constant heat loads and constant pumping power.

Master of Science in  
Mechanical Engineering  
September 1978

Advisor: Paul J. Marto  
Mechanical Engineering  
Department

Performance of Multiple Nozzle Eductor Systems  
with Several Geometric Configurations

Robert James Lemke  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1969

and

Christopher Paul Staehli  
Lieutenant, United States Navy  
B.S.M.E., University of Washington, 1970

Cold flow tests of a four nozzle eductor system were conducted to evaluate the system's performance with the following geometric modifications: changing the area ratio of the mixing stack to primary flow nozzles from 3.0 to 2.5; adding a solid diffuser to the exit of the mixing stack; adding two- and three-ring diffusers to the exit of the mixing stack; adding film cooling ports along the length of the mixing stack; and combining the effects of film cooling ports, a two-ring diffuser and a shroud. Non-dimensional parameters governing the flow phenomena are developed from a one-dimensional analysis of a simple eductor system based on the conservation of momentum for an incompressible gas. The eductor performance is evaluated in terms of these non-dimensional parameters. Within the range of modifications considered, the configuration with the film cooling ports, shroud and two diffuser rings provided the best overall eductor system performance.

Master of Science in  
Mechanical Engineering  
September 1978

Thesis Advisor: P. F. Pucci  
Mechanical Engineering  
Department

# Multivariable Control of a Marine Boiler

Michael Miller

Lieutenant, United States Navy  
B.S.E.E., Pennsylvania State University, 1969

An integral output controller is developed for small load changes to a Foster Wheeler ESD-III boiler. The CONSYN program, a coding of modern control algorithms, is utilized to produce a feasible control law for a developed state variable boiler model. The resultant closed loop responses of both a full (10th) order and a reduced (7th) order boiler model are determined using CSMP-III, the IBM simulation language.

Master of Science in  
Mechanical Engineering  
September 1978

Thesis Advisor: T.M. Houlihan  
Mechanical Engineering  
Department

## The Fluidyne Heat Engine

David Cottrell Mosby  
Lieutenant, United States Navy  
B.S., Prairie View A. & M. University, 1970

Laboratory tests were conducted on a small scale Fluidyne heat engine in the loaded and unloaded configuration to evaluate the effect of geometric changes on the system's operating characteristics. Liquid column displacements, gas temperature, and pressure were the primary variables measured for various heat inputs and gas volumes. Representative outputs were a pumping rate of 0.0976 gal/min through a head of 0.825 ft, with an overall efficiency of .15%, and operating pressures as high as 5 psig. The results of the experimental program are presented together with a summary of the principles of operation.

Master of Science in  
Mechanical Engineering  
September 1978

Thesis Advisors: R.H. Nunn &  
D. Salinas  
Mechanical  
Engineering Dept.

THE EFFECTS OF MULTIPLE WELD  
REPAIRS ON THE  
ALUMINUM-MAGNESIUM ALLOY 5083-0

by

George R. Speight, Jr.  
Lieutenant, United States Coast Guard  
B.S., United States Merchant Marine Academy, 1970

The effects of multiple weld repairs on the aluminum-magnesium alloy 5083-0 as used in the primary self-supporting containment systems for Liquified Natural Gas Tankships were studied. The changes experienced by the material in microstructure, mechanical properties and stress-corrosion susceptibility as a function of number of weld repairs were carefully characterized and recorded. The results of these findings are discussed from both the metallurgical and the practical engineering standpoint.

Master of Science in  
Mechanical Engineering  
September 1978

Advisor: T. R. McNelley  
Mechanical Engineering  
Department

A Numerical Study of Barotropic  
Instability of a Zonally Varying Jet  
with Cyclic Boundary Conditions

Bruce Melvin Nagle  
Captain, United States Air Force  
B.S., Mathematics, Westminster College, 1966  
B.S., Meteorology, University of Utah, 1968  
MBA., Golden Gate University, 1976

Tupaz et al. (1978) formulated a model to study the behavior of waves in an unstable jet which varied downstream. The linearized barotropic vorticity equation was solved numerically. Waves were forced with a fixed period on the eastern boundary and a radiation condition was applied on the western boundary.

In this thesis, cyclic boundary conditions are used on the eastern and western boundaries. The numerical solutions show amplitude growth in time which is approximately exponential. The solutions are normalized and the wave structure is obtained during three time segments. The wave structures are not the same during these segments, but they are very similar in areas of large amplitudes. In these regions the behavior is very similar to that obtained by Tupaz et al. (1978).

Master of Science in  
Meteorology  
September 1978

Advisor: Roger T. Williams  
Department of  
Meteorology

Improvements in Tropical Cyclone  
Motion Prediction by Incorporating  
DMSP Wind Direction Estimates

Thomas Paul Walters  
Captain, United States Air Force  
B.S., Memphis State University, 1972

The wind fields used to initialize a coarse grid tropical cyclone motion prediction model were re-analyzed to include wind direction estimates based on Defense Meteorological Satellite Program (DMSP) photographs. An average of 20 upper-level direction estimates based on cirrus streaks and 17 low-level directions were available for the 32 cases considered. A modified version of the Barnes (1973) objective analysis scheme was used to re-analyze the initial fields provided the model. A control experiment with an analytic representation of a typhoon embedded in a basic current was used to test the effects of data distribution in the objective analysis scheme. Although a direct re-analysis of wind direction was useful in the region of the typhoon, a scheme for analyzing the u and v components was adopted. The speed at the location of the wind direction estimate was interpolated from the first guess wind field provided by Fleet Numerical Weather Central. Track forecast errors for the tropical cyclone model initialized with the new analyses including the satellite data were compared with model forecast errors based on the original wind analyses. The inclusion of the DMSP direction estimates failed to improve the error statistics for the 32 cases from the 1975 season. Improved forecast accuracy occurred only when the incorporation of the DMSP wind direction estimates produced significant improvements in the wind fields in the immediate vicinity of the storm or in areas into which the storm eventually tracked. The incorporation of direction estimates located on the periphery of typhoons failed to re-direct the initial storm motion.

Master of Science in  
Meteorology  
June 1978

Advisor: Russell L. Elsberry  
Department of Meteorology



## MEASURING SHALLOW WATER WAVES

### WITH PRESSURE SENSORS

Vitor Manuel Henriques Goncalo  
Lieutenant, Portuguese Navy

For two locations within the surf zone sea surface elevations were observed using a wave staff and a pressure sensor while simultaneously the two horizontal orthogonal components,  $u$  and  $v$ , of water particle velocity were measured.

Surface elevations derived from pressure sensors are lower, mainly in the region of the crest, compared with the same surface elevations measured with wave gages. Pressure records are more smoothed than wave gage records, and the energy computed for waves measured with a pressure sensor is consistently smaller than for waves measured with a wave gage.

Methods for converting pressure to surface elevation are given which include the non-linear velocity term ( $u^2+v^2$ ) which is usually neglected in the Bernoulli equation. Two techniques are proposed to include this term: 1) flowmeters are used to measure  $u$  and  $v$ , and 2) the Bernoulli term is derived by determining the velocities by convolving the pressure records using a weighting function determined from shallow water theory.

The first technique gave improvements on the order of 3.4% to 7.8% of the total variance of the wave gage spectrum, whereas the second technique gave improvements on the order of 3.1% to 9.7%. The improvements in both cases are approximately the same, with the second technique having the advantage of requiring only a pressure transducer.

Master of Science in  
Meteorology and Oceanography  
September 1978

Advisor: E. B. Thornton  
Oceanography Department

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Mass, Salt, and Heat Transport  
in the South Pacific

Louis Sherfese III  
Lieutenant, United States Navy  
B.S. (Oceanography), Univ. of Washington;  
B.S. (Geology), Univ. of Washington, 1969

Utilizing data from a four month period (SCORPIO Expedition, 1967) an analysis was made of the various characteristics of the South Pacific Ocean.

This investigation was based on the primary assumption that the geostrophic approximation was valid. A level of no motion was established at 762m and 1203m for the latitudinal sections of  $28^{\circ}\text{S}$  and  $43^{\circ}\text{S}$  respectively, which satisfied mass and salt continuity requirements. Comprehensive temperature and salinity data extended from the western boundary to the eastern boundary of the South Pacific Ocean, and from the sea surface to the sea floor.

Net meridional mass, salt and heat transport values were calculated dependent on a selected level of no motion for each of the latitudinal sections. These transport values were then attributed to specific water masses. The current circulation for the Upper Layer was determined to be anti-cyclonic while the Bottom Layer was cyclonic. The Upper Layer had a net northern transport at both latitudes, while the Intermediate Layer had a net southern transport at  $28^{\circ}\text{S}$  and a northern transport at  $43^{\circ}\text{S}$ . The Deep Layer had a net southern transport along both latitudes with the Bottom Layer having a net northward transport.

Along both latitude lines, there was determined a net northward heat flow of 33 and  $77 \times 10^{12}$  cal/sec for the  $28^{\circ}\text{S}$  and  $43^{\circ}\text{S}$  latitudinal sections. Given the initial assumptions made, this slight northward heat transport is probably within the range of error for this study.

Master of Science in Meteorology and Oceanography  
September 1978

Advisor: Glenn H. Jung  
Dept. of Oceanography

The Frequency-Dependent Response and  
Asymptotic Properties of  
Turbulent Mixing in the Upper Ocean

Jae-Yul Yun  
Lieutenant, Korean Navy  
B. S., Seoul National University, 1974

The underlying purpose of this research was to understand and predict the response of upper ocean boundary layer mixing to high frequency oscillations in the atmospheric forcing attributable to the diurnal heat flux cycle, unsteadiness in the wind, and other short term changes. To accomplish this task, a non-stationary, one-dimensional bulk model of the mixed layer originally proposed by Garwood (1976, 1977) is generalized by deriving a new equation for the entrainment buoyancy flux which includes the unsteady term. To examine the importance of the unsteady term, a reduced form of the turbulent kinetic energy equation is solved numerically. The results predict the high frequency cutoff above which the unsteady term should not be neglected. The quasi-steady state assumption is accurate only for low frequency forcing up to this cutoff. There was also some dependence upon the amplitude of the imposed forcing. To investigate the asymptotic properties of the mixed layer model, the full form of the Garwood model is solved numerically and compared with the solutions to the de Szoeke and Rhines model. The results of this research provide a theoretical basis for realistically applying the mixed layer models to ocean boundary layer problems on all time scales.

Master of Science in Meteorology & Oceanography  
September 1978

Advisor: RW Garwood Jr.  
Department of  
Oceanography

Mass, Salt, and Heat Transport Across Seven Latitude Circles  
in the North Atlantic Ocean: A Description of the  
General Circulation Based on Geostrophic Calculations  
From International Geophysical Year and Adjacent Data

Timothy L. Baker  
Lieutenant, United States Navy  
B.S., Villanova University, 1971

This report using data from a five year period, including the International Geophysical Year (1954-1959), presents a detailed analysis of several aspects of the physical oceanography of the North Atlantic Ocean.

Assuming the geostrophic approximation to be valid, a level of no motion was established by satisfying the requirement of mass and salt continuity across seven latitude sections extending from  $8^{\circ}\text{N}$  to  $48^{\circ}\text{N}$ , with each latitude section providing comprehensive temperature and salinity data extending from coast to coast and from the sea surface to the ocean floor.

Based on this level of no motion, net meridional heat transport values were determined for each latitude section and compared with those of previous studies for the North Atlantic Ocean and the Northern Hemisphere. The results of this comparison indicate that the inclusion of the heat transported in the bottom peripheral areas of the latitude sections did not affect the overall flux of heat to any appreciable degree when compared to results proposed by Jung (1974-1976) using the same data ignoring the bottom area. Also, it is seen that the meridional heat transport during the I.G.Y. was anomalously low when compared to values taken from 1955-1973.

Lastly, a general circulation pattern was developed from mass transport values for each of three layers of water: Upper Water, Intermediate Water, and Deep and Bottom Water. These circulation patterns are also compared with past descriptions of the general circulation; most notably, those of Sverdrup et al. (1942), Jung (1955), and Worthington (1976). The circulation patterns find good support with all three authors in the Upper and Intermediate Waters, but sharp contrasts exist between the deep and bottom circulation and that proposed by Worthington for his Deep Layer. Strong support for the pattern developed in this study is provided, however, by the works of Schmitz (1977), and Tucholke, Wright, and Hollister (1973).

Master of Science in  
Oceanography  
June 1978

Advisor: Glenn H. Jung  
Oceanography Department

Rock Boring Bivalves and Associated  
Fauna and Flora of the Intertidal  
Terrace at Santa Cruz, California

Gerald Wayne Clark  
Lieutenant, United States Navy  
B.S., Texas A&M University, 1969

Two areas along the intertidal terrace at Santa Cruz, California, were surveyed for rock boring bivalves. At one location, all associated macroscopic epibenthic fauna and flora were identified and quantified. Rock samples were collected representing all rock types where borers were found. Results showed that Penitella penita was the most abundant rock borer in both locations, being found to heights of 2+ meters above MLLW. The next most common borers were two species of Adula. Rock analysis showed that 32 out of 34 samples had calcium carbonate content less than 0.8% by weight, thereby indicating that in these locations the boring mechanism is probably not chemical.

Master of Science in  
Oceanography  
September 1978

Advisor: E. C. Haderlie  
Department of  
Oceanography

Acoustical Oceanography of the  
Levantine Sea

Nazim Cubukcu  
Lieutenant, Turkish Navy  
Turkish Navy Academy, 1971

Data on oceanographic conditions in the Levantine Sea in the eastern end of the Mediterranean Sea were compiled. Water masses, bottom sediments, and bottom topography are described. Four locations were chosen as representative of the Levantine Sea. Acoustic propagation was modelled for four different months in the 50 to 5000 Hz frequency range for source and receiver depths of 21 to 300 ft at each location. Optimum passive detection of submarine targets was found to occur when source and receiver were at the same depth. This could be achieved with the sonar either on a submarine or lowered below a surface ship.

Master of Science in  
Oceanography  
September 1978

Advisor: Alden B. Chace  
Department of Oceanography

Finestructure, Fronts and Currents in the  
Pacific Marginal Sea-Ice Zone -  
MIZPAC 77

Gordon Patrick Graham  
Lieutenant Commander, Canadian Armed Forces  
B.S., University of Victoria, 1969

Sharp vertical temperature fronts and complex temperature inversions observed in the Chukchi Sea during MIZPAC 77 were investigated in a further effort to define the mechanisms for the formation of finestructure. An association was found between the upper level current directions inferred from the gross ice edge recession rates and the occurrence of fronts and finestructure. Currents with a strong directional component normal to the ice edge were associated with extensive finestructure and those with a weak component were associated with sharp fronts but little or no finestructure. Six closely spaced crossings of the Alaskan Coastal Current made it possible to describe the circulation in greater detail than was previously possible. A peculiar ice bay was discovered off Point Barrow in which there was extensive finestructure, including some which was deeper than any previously observed.

Master of Science in  
Oceanography  
June 1978

Advisors: R. G. Paquette  
R. H. Bourke  
Department of  
Oceanography



# Probability Density Functions of Breaking Waves

George Schaeffer III  
Lieutenant, United States Navy  
B.S., Albright College, 1971

Waves in the surf zone are a highly nonlinear process which is evident by the appearance of secondary waves. The secondary waves appear as strong peaks in the period PDFs corresponding to the first harmonic of the peak of the wave spectrum. The strong first harmonic period peak is also reflected in the highly correlated height and velocity PDFs.

Breaking waves may be viewed as a gradation between two extremes. The period, height and velocity PDFs for spilling breakers generally were unimodal, whereas for plunging breakers strong bimodality was found.

The joint probability density functions for periods and heights of the breaking waves show high correlation (0.60-0.80) which says that greater wave periods are associated with larger breaker heights. The joint PDFs of period and particle velocity, and velocity and height, suggest that the maximum onshore particle velocities are correlated with both the wave periods and wave heights.

Due to the high probability of the secondary waves, the mean wave period for breakers is a poor descriptor of the average period of the offshore incident waves.

Master of Science in  
Oceanography  
June 1978

Advisor: Edward B. Thornton  
Department of  
Oceanography

## Ocean Wave Group Analysis

Dean Gordon Sedivy  
Lieutenant, United States Navy  
B.S., Oregon State University, 1972

A computerized method for the identification of wave groups and determination of their properties from digital wave data was developed. Analysis was performed on 208 Southern California wave records. It was found that the number of waves in a group is independent of both the spectral peak period and the variance of the wave record. However, the amount of energy contained in wave groups relative to that in the record increases as the total energy of the record increases. Also, average group periods of greater than the spectral peak period are not uncommon. Both an increase in group energy relative to the wave record and also the number of waves in a group increase the possibility of obtaining an extreme wave height in a group relative to the significant wave height of the record. Finally, it is apparent that as the average group period approaches the spectral peak period of a record, all other highly dependent wave group properties take on their maximum values.

Master of Science in  
Oceanography  
September 1978

Advisor: Warren C. Thompson  
Department of  
Oceanography

ANALYTICAL HAZARD REPRESENTATIONS FOR USE IN  
RELIABILITY, MORTALITY AND SIMULATION STUDIES

Mustafa Acar  
Lieutenant, Junior Grade, Turkish Navy

A variety of simple analytical models for increasing, decreasing and "bath tub"-type failure rates are discussed. The purpose of this thesis is to develop analytical hazard representations for use in reliability and maintainability studies, and to evaluate them in use for data analysis. Verification of the model was accomplished by computer simulation. They were applied to human mortality and other failure time data.

Master of Science in  
Operations Research  
September 1978

Advisor: D. P. Gaver  
Operations Research  
Department

A Simulation Study of a  
Class of First-Come First-Served  
Queues with EARMA Correlation Structure

Prasert Boonsong  
Lieutenant Commander, Royal Thai Navy  
B.S., Royal Thai Naval Academy, 1964

The object of this thesis is to examine, via simulation, the properties of a class of single-server, first-come first-served queues in which the service times and interarrival times, while still marginally exponential, are auto-correlated and cross-correlated. The correlation is introduced by letting the service and interarrival sequences be EARMA-type processes, where EARMA stands for exponential autoregressive, moving average sequence. An extension of these ideas brings in the cross-correlation. The waiting times in the dependent queue are compared to the waiting times (with known distribution) in the independent M/M/1 queue using data analytic and formal statistical methods. Variance reduction techniques are also studied; these use distributionally known aspects of the M/M/1 queue (simulated with the same exponential sequences as the dependent queue) to control the unknown aspects of the dependent queue.

Master of Science in  
Operations Research  
September 1978

Thesis Advisor: P.A.W. Lewis  
Operations Research  
Department

Efficient Estimation of Negative Binomial  
Parameters Using Empirical La Place Transform

Resai Caglayan  
Lieutenant, Turkish Navy  
Turkish Naval Academy, 1972

A new method, based on empirical La Place transform, was developed to find asymptotically efficient estimates of negative binomial distribution parameters. These estimates were found fairly close to those found by the method of maximum likelihood. Efficiencies over 95 percent were obtained. The method was tested with a set of data, generated by computer, and found to be satisfactory except in a few cases. Maximum likelihood also fails to be satisfactory in these cases.

Master of Science in  
Operations Research  
September 1976

Thesis Advisor: R.R. Read  
Operations Research  
Department

The Evaluation of Design and Employment Alternatives  
for the LVA: A Modelling Strategy

David Larkin Chadwick  
Captain, United States Marine Corps  
B.S., Rensselaer Polytechnic Institute, 1971

This thesis presents a modelling strategy for the evaluation of complex combat systems during their conceptual design phase. It proposes the use of a relatively simple auxiliary model in conjunction with a high-resolution combat simulation. The simple model is used to enhance the analyst's ability in investigating the full range of possible effects of decisions regarding various design and employment alternatives, while the complex model is implemented to validate certain tentative hypotheses formed from the auxiliary model results.

This general methodology is illustrated by considering a specific system of current interest to the U. S. Marine Corps, the LVA (Landing Vehicle Assault). A simplified auxiliary model is developed which is initially applied to an evaluation of several tactical employment alternatives. The distance offshore at which the craft initiates transition and the interarrival time between incoming waves are examined in detail. The model is additionally implemented to derive the interrelationships of the LVA design parameters with the vulnerability of that system to the attrition effects of two representative defensive direct-fire weapon systems.

Master of Science in  
Operations Research  
September 1978

Advisor: James G. Taylor  
Operations Research  
Department

An Examination of the Command, Control and  
Communications System of A  
U.S. Marine Corps Amphibious Assault Wave

Mark Anthony Costa  
Captain, United States Marine Corps  
B.S., United States Naval Academy, 1973

This thesis examines the Command, Control and Communications procedures of an amphibious assault wave. The examination is preformed by the presentation of a model of the communication networks of a wave. Computer simulation results of the model are presented as an examination of the model's parameter sensitivity. Modifications are further extensions of the basic model are also discussed. The model presented was originally designed for the LVTP7 tracked amphibious personnel carrier, the vehicle presently in the U.S. Marine Corps inventory. The model was also adapted to defined design parameters of the Landing Vehicle Assault (LVA), the proposed successor to the LVTP7 tractor.

Master of Science in  
Operations Research  
June 1978

Advisor: F.R. Richards  
Department of  
Operations Research

A Procedure to Facilitate Testing of a  
Two-Sided Composite Null Hypothesis About the  
Mean of a Normally Distributed Random Variable

Michael William Davis  
B.S., University of Maryland, 1970

A procedure was developed to aid in the testing of a two-sided composite null hypothesis about the mean of a normally distributed random variable for situations where either the population variance is known or unknown. The procedure was designed to eliminate the requirement for iterative type solution techniques normally used in determining the acceptance or rejection region of the subject hypothesis. This thesis provides guidelines, curves, and tables which will aid in testing a two-sided composite null hypothesis. Provisions were also incorporated into the procedure to permit testing of hypotheses about the relative displacement of the coefficient of variation from zero.

Master of Science in  
Operations Research  
September 1978

Thesis Advisor: R. R. Read  
Operations Research  
Department



## A Statistical Study of Noap Data

Ali Ekmekci  
Lieutenant, Turkish Navy  
Turkish Naval Academy, 1971

This thesis examines spectrometric oil analysis data in an attempt to determine which of various sources can affect the spectrometer read-out.

The analysis of variance is used to a large extent in the study made of operational data gathered by the Naval Air Rework Facility, Pensacola, Florida. In order to satisfy the normality and independence assumptions of ANOVA, results obtained in a previous study on the same type of data have been used. Some transformations of the data have been made so that the third assumption, homogeneity of variance, can be more nearly satisfied.

Master of Science in  
Operations Research  
September 1978

Advisor: Harold J. Larson  
Operations Research  
Department

A Survey of Allocation Models  
in  
Search Theory

Brian David Engler  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1969

The problem of optimally allocating available efforts to search for an object at sea comprises a major class of problems in naval warfare. This thesis presents in some detail Koopman's classic two-region and continuous search models, along with the n-region discrete model which provides some continuity between the two. Brief summaries of four of the more important extensions to the basic theory are also included.

Master of Science in  
Operations Research  
June 1978

Advisor: James G. Taylor  
Department of Operations  
Research

A Method to Determine  
Divisional Engineer Battalions'  
Training Measures of Effectiveness

Lee Preston Gibson Jr.  
Captain, United States Army  
B.S., Virginia Polytechnical Institute and State University, 1971

This thesis presents a methodology to determine the training measures of effectiveness for divisional engineer battalions. The evolution of the present Army training system and the divisional engineer battalion's structure are discussed. The representation of engineer critical tasks as networks and an analysis of the tasks' training measures of performance are developed. The analysis of the measures of effectiveness determined by the interaction of training and hardware measures of performance in a combat model provides the transition from training performance to combat effectiveness. The tasks network representation; the combat model and recommended changes and additions to the present training system are combined to form a proposed training management system.

Master of Science in  
Operations Research  
September 1978

Thesis Advisor: S.H. Parry  
Operations Research  
Department

## WARSHIP EFFICIENCY IN A CHANGING ENVIRONMENT

Roald Gjelsten  
Lieutenant Commander, Royal Norwegian Navy  
Graduate, Norwegian Naval Academy, 1967

In the course of the last few years the main attributes of the conscripted sailors summoned to serve their compulsory time in the Royal Norwegian Navy have changed substantially, especially regarding level of education and attitudes toward formal authority. Similar developments have taken place in the Norwegian society at large during this period while the mission of the Navy has remained approximately the same.

This study describes and discusses various approaches a commanding officer of a frigate in the RNoN could choose to establish an effective unit under present individual and societal circumstances; the difficulties he is likely to experience and decisions he has to make, when attempting to adjust traditional patterns of leadership philosophy and style to match current challenges.

Master of Science in  
Operations Research  
September 1978

Advisors: Dr. J. K. Arima and  
Dr. D. E. Neil  
Operations Research  
Department

An Analysis of  
Navy Inventory Models and  
A Proposal for Non-Automated Ships

Howard Paul Gorman, Jr.  
Lieutenant, Supply Corps, United States Navy  
B.S., United States Naval Academy, 1969  
M.S.A., The George Washington University, 1974

The theoretical background of the Navy's inventory models is presented and the problems inherent in the models are discussed. The four principal Navy inventory models are described and evaluated, i.e., the Uniform Inventory Control Program (UICP) model, Variable Operating and Safety Level (VOSL) - the stock point model, the Shipboard Uniform Automated Data Processing System (SUADPS), and the non-automated afloat model. A new approach to Navy inventory management is presented. This new approach requires the models to be based on theory that assumes only information that can be accurately predicted and to operate using all such information that results in better inventory policies. It also requires the inventory manager to define his objective in reorder point determinations. A detailed proposed new model for non-automated ships, based on the new approach, is presented. The proposed model minimizes customer requisitions short subject to a constraint on average inventory investment and was found to be clearly superior to the present model based on computer simulation results.

Master of Science in  
Operations Research  
September 1978

Thesis Advisor: F. R. Richards  
Operations Research  
Department

An Evaluation of Customer Delay in  
A Telecommunications Switchboard  
Subject to Two Types of Customer Demands

Joseph Fulton Jennings Jr.  
Captain, United States Marine Corps  
B.S., University of Virginia, 1972

A queuing system is investigated in which two types of customers, Type 1 and Type 2, attempt to access a multi-server operator switchboard. Customer arrivals for each type are assumed to be in accordance with independent Poisson processes with time constant parameters. Service times are assumed to be exponentially distributed and each type of customer has a different service rate. When a queue is formed, Type 1 customers are allowed to queue regardless of the length of the queue but Type 2 customers are blocked when the queue size exceeds a predesignated limit.

An exact solution of the problem was not obtained and a discussion of the complications which precluded an exact solution is presented. A simulation algorithm is developed and validated by comparison with an exact solution of the special case of the problem in which the service rates are equal.

Finally, an analytical approximation is developed and shown to give reasonable results by comparison with the simulation model.

Master of Science in  
Operations Research  
September 1978

Thesis Advisor: D. P. Gaver  
Operations Research  
Department

A QUANTITATIVE ANALYSIS OF DEFENSE  
EXPENDITURE PATTERNS IN WARSAW TREATY  
ORGANIZATION COUNTRIES 1960-1974

John G. Kuchinski, Jr.  
Lieutenant Commander, United States Naval Reserve  
B.B.A., Georgia State University, 1974

This thesis analyzes military expenditure patterns for the East European members of the Warsaw Treaty Organization. The study examines data using a cross-sectional methodology for 1966 and 1974, and a longitudinal methodology for the period 1960-1974.

Non-parametric statistical methods as well as correlation and regression analysis are used to uncover the various factors most influential in WTO defense budgeting, both region-wide and for specific member countries.

Forecasting models are developed for use in predicting military expenditures for individual countries as well as the "typical" WTO country. A general discussion of model use with different data sources is also presented.

Master of Science in  
Operations Research  
September 1978

Advisor: Paul R. Milch  
Operations Research  
Department

**HUMAN FACTORS IN FIELD EXPERIMENTATION DESIGN AND ANALYSIS  
OF AN ANALYTICAL SUPPRESSION MODEL**

**Michael Peter Mueller**  
Captain Federal German Army  
Ingenieur (graduiert), 1974, Technical Military Academy,  
West-Germany

**Karl-Heinz Pietsch**  
Major Federal German Army  
Betriebswirt (graduiert), 1971, Technical Military Academy,  
West-Germany

The primary objective of this study was to provide a contribution to the phenomenon "Suppression" as an aspect within the military environment.

Analytical models explaining these aspects were developed in order to identify the influences to suppression. Techniques are examined for including the suppressive effects of weapon systems in Lanchester type combat models, which may be useful in wargame evaluations of military judgements, and in force level planning. The study also provides techniques to analyze and fit experimental data to the analytical models.

The data to verify the models were obtained from related experiments performed by Combat Development Experimentation Command (CDEC), Fort Ord, California.

The result for the modelling approach to suppression indicates source dependences on quantitative as well as on qualitative features.

The functions are left quite general, although some functional forms are derived and discussed.

Master of Science in  
Operations Research  
September 1978

Thesis Co-Advisors: D. P. Gaver  
G. K. Poock  
Operations Research  
Department



## An Evaluation of Three Reliability Growth Models

Richard Oren Neal  
Major, United States Marines  
B.E.E., North Avenue Institute of Technology, 1967

This thesis presents an evaluation of three relatively simple reliability growth models for which accuracy, precision, and robustness performance were examined over a wide variety of true underlying reliability growth patterns. A continuous cumulative failure rate model, a continuous instantaneous failure rate model, and a discrete reliability model, each of which employ ordinary regression methods, were evaluated using standard computer Monte Carlo simulation techniques. Simple, straightforward statistical measures of performance are exhibited in graphical and tabular form. All the models displayed some degree of difficulty in tracking particular types or portions of anomalous reliability growth patterns. The cumulative model displayed this difficulty the least and exhibited good variability (precision) performance providing confidence in its use. The instantaneous model, while displaying generally good accuracy, exhibited poor variability performance. Except for a couple of anomalous situations, the discrete model showed good accuracy and variability performance. Forecasting performance of all the models proved to be worse than their capability to determine current reliability status.

Master of Science in  
Operations Research  
June 1978

Advisor: W. Max Woods  
Dean of Educational  
Development

## Myopic Search Plans

Antonio Francisco de Paula Neto  
Lieutenant Commander, Brazilian Navy  
Graduate, Brazilian Naval Academy, 1964

Different strategies can be used to search for a moving object. If the searcher's action at each time unit maximizes his chances of immediate detection, his strategy is said to be myopic. If, however, the searcher seeks to allocate search effort to maximize the probability of detecting the target within a preset amount of time, his strategy is called optimal.

This thesis documents interactive computer programs that are useful for testing search strategies against the myopic strategy, and shows examples where the myopic strategy is not optimal.

Master of Science in  
Operations Research  
September 1978

Thesis Advisor: A. R. Washburn  
Operations Research  
Department

## THE EXPECTED LENGTH OF A MYOPIC INVESTIGATION

Peter Carlton Olsen  
Lieutenant, United States Coast Guard  
B.S., United States Coast Guard Academy, 1970  
M.S., University of West Florida, 1975  
M.S.A.E., Naval Postgraduate School, 1977

This thesis addresses the problem of estimating the distance which must be traveled to visit all the targets in a search area. The search area is assumed to be a compact area drawn from an infinite Poisson field. Targets are visited in "nearest uninvestigated neighbor" order. A simplified analytical model is developed for the unbounded investigation. This model is used to provide heuristic justification for simulation results obtained for the bounded investigation.

Master of Science in  
Operations Research  
September 1978

Advisor: F. Russell Richards  
Operations Research  
Department

## The FFG-7 Frigate, An Application of the Design-to-Cost Concept

Jose Antonio Teixeira Cervaens Rodrigues  
Commander, Portuguese Navy  
Graduate, Portuguese Naval Academy, 1960

This thesis is the application of the concept of design-to-cost of the project of the FFG frigates. Using the available data relative to the major escort programs since 1950, a curve of force effectiveness vs. number of ships, similar to that presented by Vice Admiral Price in his congressional testimony on design of the patrol-frigate or FFG-7, was constructed and the results discussed.

Master of Science in  
Operations Research  
September 1978

Advisor: Michael O. Sovereign  
Operations Research  
Department

A Decision Procedure for the Transition from Uncertainty  
to Risk in a Single-Period Inventory Problem

Kadir Sagdic  
Lieutenant, Turkish Navy  
B.S., United States Naval Postgraduate School, 1978

Minimum expected-cost solutions to the single-period inventory problem (the Newsboy problem) have been well known for many years, for risk cases where the distribution of demand is known. Also well known are minimax cost and Laplace solutions for the uncertainty case where only the range of demand is known. This study explores the use of order-statistic-based quantile estimators as decision procedures while data gathers during the early decision periods. Simulation, using a variety of demand distributions and unit-cost values, provides recommendations on which period to leave the minimax procedure for a suggested data-based decision rule which will be asymptotic to the optimal risk procedure.

Master of Science in  
Operations Research  
September 1978

Advisor: G. F. Lindsay  
Operations Research  
Department

Methodology for Evaluation of the United States Army  
Combined Arms Tactical Training Simulator (CATTS)

Raul Hector Torres  
Captain, United States Army  
B. S., Polytechnic Institute of Brooklyn, 1973

The Combined Arms Tactical Training Simulator (CATTS) is studied with a view towards evaluating the training effectiveness of command and control instruction. The objectives and goals of the CATTS system are reviewed, as well as the training system itself. Concepts and methodology for the evaluation of the CATTS system are presented, with a proposed test procedure outlined.

Master of Science in  
Operations Research  
June 1978

Advisor: James G. Taylor  
Operations Research  
Department

Improved Confidence Intervals for the  
Variance and Standard Deviation of a  
Normal Population

Archie Andrew Turner, III  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1969

Shortest confidence intervals for the variance of a normal population are found as superior alternatives to the widely used equal-tail confidence intervals. Extensive tables of high precision are presented which enable the user to construct easily minimum-length confidence intervals for the variance, the standard deviation, and shortest unbiased confidence intervals. Characteristics and improved performance of the alternative confidence intervals are discussed in detail and illustrated graphically, with an emphasis on the optimal distribution of complementary tail area between the upper and lower tails.

Master of Science in  
Operations Research  
September 1978

Thesis Advisor: R. R. Read  
Operations Research  
Department

## Effectiveness of Navy Advertising

Thomas Cloud Williams, Jr.  
Lieutenant, United States Navy  
B.S., New Mexico State University, 1968

This analysis was performed to evaluate the effectiveness of Navy recruiting advertising in producing fully qualified, first-term enlistments during calendar years 1976 and 1977. Advertising expenditures and enlistment data were allocated to the county level by month. Advertising expenditures for the general enlisted program included national media, local advertising by recruiting districts, and the recruiting aids utilized by recruiting districts. The total enlistments and the enlistments of high school graduates (HSG) scoring above the 50th percentile on the Armed Forces Qualification Test (AFQT50) were also aggregated by county by month as measures of the quantity and the quality of enlistments. Recruiter goals, the number of recruiters, the number of Qualified Military Available (QMA), the number of high school graduates, and the unemployment rate were also included. All of the variables, except unemployment rate, were normalized for the QMA. Cases from December 1976, with zero enlistments, and with enlistment rates (total enlistments per QMA) exceeding .005 were considered outliers and not included in the study. Data was fit to a linear, least squares model.

Master of Science in  
Operations Research  
September 1978

Advisor: J. K. Arima  
Administrative Sciences  
Department



An Interactive Software Package  
for Time Series Analysis

Stephen Russell Woodall  
Lieutenant Commander, United States Navy  
B.S., United States Naval Academy, 1967

An expanded package of interactive FORTRAN computer programs has been developed for the analysis and forecasting of time series data. The package, called the Time Series Editor, is designed to employ the iterative Box-Jenkins methodology of time series analysis. The Time Series Editor was developed for time-shared use on the Control Program/Cambridge Monitor System (CP/CMS) at the U.S. Naval Postgraduate School, but can be modified for use on other time-sharing systems with a FORTRAN capability. The Time Series Editor assists in data preparation and entry, analysis, modeling, forecasting and diagnostic testing. Utilization of the package, following the included User's Guide, requires only a limited knowledge of the computer system, with all required user responses interactively prompted by the Editor.

Master of Science in  
Operations Research  
and  
Master of Science in  
Applied Mathematics  
September 1978

Thesis Co-Advisors: F.R. Richards  
Operations Research Department  
F.D. Faulkner  
Mathematics Department

Power Spectra of Geomagnetic Fluctuations  
Between 0.1 and 10.0 Hz

John Michael Barry  
Lieutenant, United States Navy  
B.S.E.E., United States Naval Academy, 1971

An optically pumped Cesium vapor magnetometer was used to measure the temporal fluctuations of the total geomagnetic field at Monterey, California. Power spectra were obtained from these recordings for the frequency range 0.1 - 10 Hz. Measurements were made during the month of April 1978 with the Kp index varying from 0+ - 8+. The power spectra obtained displayed a characteristic -20 dB/decade slope from 0.1 - 2.0 Hz and were essentially flat between 2.0 - 10. Hz. Measurement times were: Local night (0000-0200), local morning (0800-1000) and local afternoon (1600-1800). Local morning exhibited the highest power density levels, exceeding the lowest power density levels (recorded during local night) by 10dB at .1 Hz and 3dB at 10 Hz. A comparison of a magnetically disturbed day (Fredricksburg a index of 7) with a magnetically quiet day (Fredricksburg a index of 3) at the same local time (1730-1930) showed that at the low frequency end of the spectrum (.1 - .6 Hz) there was 10dB more power on the disturbed day.

Master of Science  
in Physics  
June 1978

Advisor: O. Heinz  
Department of  
Physics & Chemistry

Electroexcitation of Giant Resonances  
Between 4 MeV and 48 MeV  
Excitation Energy in  $^{140}\text{Ce}$

Hubert Hass  
Lieutenant Commander, Federal German Navy  
and

Daniel Harry Meyer  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1972

Electroexcitation of  $^{140}\text{Ce}$  was studied using 92 MeV electrons at scattering angles of  $90^\circ$  and  $105^\circ$ , and 80 MeV electrons at  $90^\circ$ . An analysis was made using DWBA calculations and the hydrodynamic model. Among the Giant Resonances found were the GDR at  $E_x = 15.3$  MeV ( $\Gamma = 4.4$  MeV), exhausting 122% of the EWSR in the mixed model of Myers, Swiatecki et al.; the isoscalar GQR at  $E_x = 12$  MeV ( $\Gamma = 2.8$  MeV, 50% EWSR); the isovector GQR at  $E_x = 25$  MeV ( $\Gamma = 6.5$  MeV, 41% EWSR in the mixed model); the  $1\hbar\omega_0$  and  $3\hbar\omega_0$  isoscalar GOR's at  $E_x = 6.0$  MeV ( $\Gamma = 1.7$  MeV, 19% EWSR) and at  $E_x = 22.0$  MeV ( $\Gamma = 4.8$  MeV, 19% EWSR); and the  $3\hbar\omega_0$  isovector GOR at  $E_x = 37.5$  MeV ( $\Gamma = 8.5$  MeV, 75% EWSR). The results agree with previous experiments in cerium and other nuclei and, generally, with the calculations of Bohr and Mottelson, Hamamoto, and Liu and Brown. The  $\Delta T$  assignments were based on microscopic and macroscopic considerations.

Master of Science in  
Physics  
June 1978

Thesis Co-Advisors: F.R. Buskirk  
R. Pitthan  
Physics and Chemistry  
Department

An Experiment to Measure  
Slant Path Extinction  
in the Marine Boundary Layer

Daniel Glen Henderson  
Lieutenant, United States Coast Guard  
B.S., United States Coast Guard Academy, 1974

An experiment to measure atmospheric extinction, along a slant path in the marine boundary layer, was devised and partially constructed. The slant path is from a kytoon, flown from a ship in motion, to a gyro-stabilized platform mounted on shipboard. The light source on the kytoon is an omni-directional high pressure xeon flash lamp, with a quartz envelope, to provide radiation from the visible to the middle IR regions of the spectrum. Wavelengths of 0.4880  $\mu\text{m}$ , 0.6328  $\mu\text{m}$ , 1.06  $\mu\text{m}$ , 1.25  $\mu\text{m}$ , 1.60  $\mu\text{m}$ , 2.20  $\mu\text{m}$ , and 3.80  $\mu\text{m}$  are isolated by use of interference filters. The range, needed in the process of determining extinction is obtained by a ranging system composed of a GaAs pulsing laser with optics mounted on the gyro-platform on shipboard, a retro-reflecting system on the kytoon, a receiver coaxial with the transmitter on shipboard, and a HP-1743-A 100 MHz oscilloscope. The pulsed laser also triggers the flashlamp on the kytoon so that synchronous detection techniques can be utilized for extinction measurements at the receivers.

Master of Science in Physics  
and  
Master of Applied Science  
June 1978

Thesis Advisor: E.C. Crittenden  
Physics and Chemistry  
Department

Inelastic Electron Scattering  
in  $^{28}\text{Si}$  Between 4 MeV and  
50 MeV Excitation Energy

Edward Echerd Hunter  
Lieutenant, United States Navy  
B.S., North Carolina State University, 1969

and

Gregory Pozinsky  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1973

91.2 MeV electrons were used to study  $^{28}\text{Si}$  in the excitation range from 4 to 50 MeV. Fragmentation of E2 strength into states below the GQR region was found, with states between 0 and 15 MeV exhausting 35% of the E2 isoscalar EWSR. Available  $(\gamma, \text{abs})$  data were used to disentangle E1 and E2 strength in the region 15 to 30 MeV and show E2 strength separated into two distinct groups in this region. A cluster of E2 strength centered at 17.5 MeV and believed to be in the oblate ground state well exhausts 22% of the E2 isoscalar EWSR and a broad but clearly separate group of strength from 20 to 30 MeV exhausts 65% of the E2 isovector EWSR. Significant transition strength was found between 30 and 50 MeV which exhausts between 25 and 35% of the total E2 EWSR. Evidence was found for the existence of an E2 giant resonance corresponding to the oblate well of  $^{28}\text{Si}$  at 24 MeV.

Master of Science in  
Physics  
June 1978

Thesis Co-Advisors: F.R. Buskirk  
R. Pitthan  
Physics and Chemistry  
Department

Computer Simulation of Light Propagation  
through a Scattering Medium

Miles Allen Millbach  
Lieutenant, United States Coast Guard  
B.S., United States Coast Guard Academy, 1973

A Monte Carlo computer model was developed to simulate the propagation of light through a scattering/absorbing medium using various parameters and phase functions. The model permits characterization of the spatial and temporal spread of light traversing plane-parallel clouds. It was found that both the time and spatial spread of light in a scattering medium are independent of the details of the phase function for a cloud thickness of greater than 15 extinction lengths.

Master of Science  
in Physics

Advisor: William M. Tolles  
Department of  
Physics & Chemistry

## MULTI-STAGE Q-SWITCHED IODINE LASER

Jeffery Mark Perin  
Lieutenant, United States Navy  
BA, University of South Florida

A two stage high energy Iodine Laser has been constructed using an existing oscillator stage that was modified so as to accept a Pockels cell and associated Brewster window stack for Q-Switching. The output of the oscillator stage was then amplified by a second stage consisting of a 2.54 cm quartz lasing tube, 120 cm long and four flashlamps contained in an elliptical reflector. In addition a gas circulation system which removes the molecular iodine and replaces the perfluoropropyl iodide was incorporated into both stages to improve output repeatability. With over 1000 shots on the oscillator stage using the original  $C_3F_7I$  liquid, no dependence on shot number, i.e. deterioration of the lasing medium, has been noted.

With 1180 Joules applied to the oscillator stage flashlamps, an output energy of 30 millijoules with a repeatability of two percent was achieved. Pulse duration measurements were detector limited. Estimates put the pulse duration at less than 100 nanoseconds.

Applying 3580 Joules to the flashlamps of the amplifier stage and using the stated oscillator output resulted in an estimated output energy of 8.2 Joules with similar repeatability and pulse duration to that of the oscillator stage alone. For both stages the output beam profile was found to be gaussian.

Master of Science in Physics  
June 1978

Advisor: F. R. Schwirzke  
Physics and Chemistry

## Shipboard Stabilization of Optical Systems

by

Robbie L. Williams  
Lieutenant, United States Navy  
B.S., University of Maryland, 1972

The control system for an existing shipboard gyro-stabilized optic tracking platform was redesigned to achieve a longer tracking range capability and improved tracking stability. The redesign increased the gain of the detector amplifier chain and improved the control system linearity. These modifications in conjunction with the addition of a mechanical viscous damper resulted in a three-fold increase in tracking range capability and significantly improved tracking stability and reliability. The maximum tracking range of the system was estimated to exceed 6000 meters. The system tracking uncertainty is approximately  $\pm 2.5$  milliradians under "sea state" 5 and is less than this under normal conditions.

Master of Science in  
Physics  
June 1978

Advisor: E.C. Crittenden, Jr.  
Department of  
Physics and Chemistry



The Horn of Africa: Historical Patterns  
of  
Conflict and Strategic Considerations

Michael Milan Ferguson  
Captain, United States Army  
B.S., The University of the State of New York, 1970

There have been few attempts to combine the historical social, and political variables which make up the regional system that is the Horn of Africa. This work presents an encapsulated analysis that attempts to provide a "complete picture" of the attitudes, events and external intrusions which contribute to the situation as it exists today. The Horn of Africa is viewed from four perspectives: (1) internal aspects, (2) regional linkages, (3) external influences, and (4) an historical interpretation. These four viewpoints are integrated to form strategic considerations and conclusions regarding the region and the potential areas of conflict or cooperation between the involved actors during the next decade.

The Horn of Africa has, does, and will in the future play an active and crucial political role, not only in Africa, but in the international system. This research is an attempt to provide policy makers with a perspective in planning for that future.

Master of Arts in  
National Security Affairs  
September 1978

Advisor: B. M. Schutz  
National Security  
Affairs Department

The Arab - Israeli Conflict:  
a Study of Global and Regional Interaction

Gregory M. Kortanek  
Captain, United States Air Force  
B.S., Northwestern University, 1967

This study of the Arab - Israeli conflict traces its historical development in the context of an evolving international system. Numerous examples have been used to illustrate the changing manner in which the core dispute of the Middle Eastern regional subsystem has influenced or been influenced by the global system. The trend which emerges is towards an increasingly subsystem dominant relationship between the global and the regional actors. The factors identified as influencing this trend are (1) the arms transfer policies of the major systemic actors, (2) the increasing systemic dependence upon Middle East Oil, and (3) the growing sense of political independence amongst the regional actors. The study concludes that the Arab - Israeli conflict can only be resolved within the framework of the essential rules of behavior of the subsystem, and that a systemically imposed settlement is unlikely. Some United States policy alternatives are suggested which are designed to facilitate the resumption of direct negotiations between the regional conflict partners.

Master of Arts in  
National Security  
Affairs  
June 1978

Advisor: John W. Amos, II  
Department of National  
Security Affairs

## Changing Concern for U.S. National Security

Charles William Lawing  
Lieutenant, United States Navy  
B.S., Millikin University, 1968

The intent of this thesis is to investigate possible measures of concern for U.S. national security. It is an exploratory attempt at categorizing, correlating, and explaining trends in Congressional, presidential, and public concern for national security between 1950 and 1977. Chapters II through IV discuss measures of Congressional concern based on defense appropriations; presidential concern based on the national security related remarks in the annual state of the union presentations and the defense budget requests; and public concern based on public opinion poll data. Chapter V discusses what the President has recommended be done and what forces and capabilities the Department of Defense has developed to counter the perceived threat to U.S. national security. The findings and conclusions of the individual chapters are then brought together in Chapter VI as a summarization and explanation of the trends and major changes in concern for U.S. national security since 1950.

Master of Arts in  
National Security Affairs  
June 1978

Advisor: Donald C. Daniel  
National Security  
Affairs Department

## Conventional Military Force and Soviet Foreign Policy

Robert B. McConnell  
Lieutenant Colonel, United States Air Force  
B.S., U.S. Military Academy, 1961

The Soviet Union has, historically, always maintained a large standing army, primarily for defensive purposes. However, after World War II and with the advent of nuclear weapons, the Soviet Armed Forces have undergone tremendous change. This paper traces the changes in Soviet attitudes towards conventional military force since World War II and attempts to illustrate the role of conventional force in Soviet foreign policy. Postwar Soviet military development is traced through four distinct phases: 1945-1953 was a period in which the Soviet military was generally a continental land army; 1954-1959 saw the introduction of nuclear weapons but little or no change in strategy and doctrine; the period 1960-1967 saw the birth of the Strategic Rocket Forces and primary emphasis on nuclear warfare; and since 1968 the Soviets have been developing both a strong nuclear capability as well as a modern conventional force capable of global deployment. In addition to historical surveys of the phases in military development, detailed analyses are presented of the Soviet military interventions in Hungary (1956) and Czechoslovakia (1968) as well as Soviet military support of the MPLA in Angola (1974-1976).

Master of Arts in  
National Security Affairs  
June 1978

Advisor: Jiri Valenta  
Department of  
National Security Affairs

The Spanish Communist Party:  
A Eurocommunist Enigma

Craig Arnold McElroy  
Captain, United States Air Force  
B.S., Iowa State University, 1970  
B.A., Iowa State University, 1974

This study reviews the historical development of the Spanish Communist Party, describing its role during the Spanish Civil War and its opposition to the autocratic Franco regime which followed. The study also analyzes the party's role in the domestic politics of emerging, post-Franco Spain as well as its role in the developing contemporary phenomenon called Eurocommunism. Employing a levels of analysis model as an analytical framework, the study concludes that the Spanish Communist Party has, in its very short period of legal existence, begun to demonstrate that it is a viable and dynamic force, both in Spanish politics as well as the international communist movement, of which policy-makers in both arenas should take serious notice.

Master of Arts in  
National Security  
Affairs  
September 1978

Thesis Advisor: David P. Burke  
National Security  
Affairs Department

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